GO WITH THE FLOW
Flow manufacturing products are ready to go. Get up to speed on the latest concepts. Pages 72 and 73

ONE CIO'S DAY
We tagged along with Richard Koeller of Chicago Public Schools. Page 40

PEERS TALK, YOU LISTEN
Computerworld survey: User show attendees soak up systems strategies and peer advice. Page 88

COMPUTERWORLD

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JOE BRUSCATO, chief architect of data warehousing at Anthem Blue Cross and Blue Shield, says he's concerned about whether the warehoused data will be retrievable in 10 or 20 years

STORM TESTS IT BACKUP PLANS

Companies work overtime to move systems, employees and data out of harm's way

BY CAROL SLIWA
AND JULIA KING

One Carolina banking chain popped its nightly backup tapes into tubs, ready for immediate departure to its disaster recovery site in Philadelphia. A Marion, S.C., textile maker took an extra step, shifting day-to-day computing to its IBM AS/400 in New Orleans. And in Jacksonville, Fla., a financial institution had to relocate about 100 employees to Atlanta.

Packing 155-mph winds and approaching the size of Texas at its peak, Hurricane Floyd last week forced information technology staffers up and down the East Coast to prepare for the worst.

Although the mammoth storm wound up skirting the Florida coast and lessening in intensity by the time it touched land in North Carolina, IT staffs had no option but to stay on alert, readying alter-

Floyd, page 105

HOME DEPOT relied on the telephone to keep shelves in Florida stores like this one in Miami stocked with batteries, plywood and other emergency supplies

DIGITAL AMNESIA

OLD NEWSPAPERS LAST ABOUT 20 YEARS before crumbling, but the magnetic tapes holding a company's mother lode of customer data may start deteriorating in 15 or less. That's a problem for companies that want to keep data longer and longer for business and regulatory reasons, reports Mitch Betts. Media decay, ever-changing data formats and the rapid turnover in hardware and software could make it impossible to retrieve that data in the future, unless companies have a long-term data archiving program.

Report is on page 22.

CLINTON EASES CRYPTO EXPORT BAN

In reversal, users to get strong security tools

BY ANN HARRISON

The Clinton administration last week recommended easing encryption export controls, relaxing restrictions on firms looking to use strong U.S. security software overseas.

But the administration also included in its announcement a final version of proposed legislation, the Cyberspace Electronic Security Act, that civil libertarians say could compromise the privacy of encrypted data.

In a reversal of two decades of U.S. encryption policy, the White House proposed allowing the export of software or hardware using any encryption key length without a license. The changes will let U.S. vendors export encryption products to companies and nongovernment users after a onetime technical review by the U.S. Department of Commerce.

Crypto Ban, page 16

GLASS HOUSE GETS ON NET TIME

Users: Speed, flexibility key to e-commerce IT

BY JAIKUMAR VIJAYAN

Business growth on the fast-paced Web means being prepared to let go of some time-consuming practices common at data centers, such as long hardware and software upgrade cycles and the extended testing of new features before rolling them out.

The emphasis should be on time-to-market and the ability to add functions incrementally and quickly.

Internet Time, page 12

SAP TAKES NEXT STEPS BEYOND R/3

Users looking for meatier ERP add-ons

BY CRAIG STEDMAN
PHILADELPHIA

SAP AG's attempt to reach beyond R/3's back-office stronghold — an effort seconded by users who want the software vendor to meet all their business application needs — has been slow to take shape.

Promised customer relationship management applications were delayed earlier this year, and SAP's first data warehousing and supply-chain planning packages only partially answered user needs. But in the next few months, SAP will try

SAP, page 16

SUCCESS STORY

Women in IT might want to take a page out of Sherita Ceasar's book when it comes to succeeding and being satisfied with their careers. Page 67

ELBOW ROOM

You pay more for less desktop, but you gain flexibility. We look at three new desktop models. Page 84

COMPUTERWORLD THIS WEEK

SEPTEMBER 20, 1999

THIS THING'S BEEN TESTED TO DEATH.

BOB FRIEDMAN, CIO OF 800-777-CLUB INC., ON WHY HE'S COMFORTABLE THAT WINDOWS 2000 IS READY TO SHIP. SEE PAGE 6.

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AT DEADLINE

Software Upgrade Caused MCI Outage

MCI WorldCom Inc. last week revealed the origin of last month's 10-day, frame-relay outage: a software upgrade. The company was in the process of upgrading its network with new Lucent Technologies Inc. software, getting 30% of the way through when it started to notice "instability" in the network. Internetworking problems with the old and new software and the lack of synchronization between the network management database and switches contributed to the outage, a spokeswoman said. Customers will receive a 20-day credit this month, whether they were impacted by the outage or not.

Microsoft, Others Join Auction Action

Microsoft Corp., Excite Inc.'s @Home and Ticketmaster Corp.'s Online CitySearch said they will join FairMarket Inc.'s auction network. Woburn, Mass.-based FairMarket will provide technology, customer service and fraud prevention to the companies that will offer auctions on their sites. Microsoft's MSN auction was launched Friday.

Nasdaq Cuts Trade Fees for Members

Nasdaq Stock Market Inc. will cut pricing for member securities dealers on its SelectNet Inc. automated trading system from its current $1 per trade in a move to fend off competition from alternative trading systems. Nasdaq said it will submit a proposal to the Securities and Exchange Commission to implement these changes in a pilot program starting Oct. 1.

Short Takes

IBM will ship 3.0 versions of its WebSphere Standard and WebSphere Advanced application servers, with Java tools, in the fourth quarter. . . . Acton, Mass.-based ANDOVER.NET, which produces technology Web sites including Slashdot.org, said Friday that it has registered to hold an initial public offering.

Virus Scanning Moving to ISPs

EDoctor cites cost savings, makes service providers the protectors of users

BY ANN HARRISON

COMPANIES MAY soon be delegating their antivirus protection to big Internet and network service providers that are acquiring new tools to guard corporate networks.

At last week's Networld/Interop '99 show in Atlanta, Cupertino, Calif.-based Trend Micro Inc. announced its eDoctor Global Network Internet antivirus service product, aimed directly at this market.

According to the company, eDoctor builds malicious-code protection into service providers' networks, allowing customers to get virus scanning as a service from their Internet providers and managed service providers. This strategy delivers updated virus protection, around-the-clock support and faster virus response.

Trend Micro said its product will reduce the cost of computer downtime due to viruses and worms, which Carlsbad, Calif.-based research firm Computer Economics said has cost businesses $7.6 billion so far this year.

Sprint Corp. in Kansas City, Mo., is licensing Trend Micro technology to provide corporate Internet gateway virus scanning as part of a suite of managed security applications for corporate customers.

US West Inc., the telecommunications company based in Denver, is using eDoctor to provide e-mail virus protection to its consumer and business Internet access subscribers. And Breakwater Security Associates Inc., a Seattle-based managed information security services provider, will use the technology, along with specialized training, to remotely manage network antivirus strategies for their customers.

Eric Hemmendinger, an analyst at Aberdeen Group Inc. in Boston, said Trend Micro is the first antivirus company to ship a product like eDoctor directly to service providers.

Hemmendinger said conversations with customers suggest that they have confidence in the product and want to hold their service providers accountable for confronting virus threats. "If you are a service provider, you will make sure that your virus signature files are updated as often as possible, and your customers will expect this, or they will fire you," said Hemmendinger. ▶

IBM Unveils 'Easier' Digital Wallet Tool

But consumers won't buy into downloading software, critics say

BY STACY COLLETT

IBM, making a second attempt at bringing impulse buying to the Internet, introduced its Consumer Wallet 2.1 software so customers can place orders quickly on the Web.

One study said 27% of online consumers abandoned orders before checkout because of arduous order forms. But "digital wallet" software — which holds a consumer's credit-card number, shipping address and other details — can automatically fill in the order fields at merchant sites.

IBM's Consumer Wallet 2.1 is the first to comply with the E-commerce Modeling Language (ECML), which gives merchants a standard way to collect electronic data for shipping, billing and payment. ECML was endorsed in June by most digital wallet vendors

Unlike IBM's first wallet, Version 1.2, the new wallet supports both SET and Secure Sockets Layer (SSL) security payment standards. Version 1.2 supported only SET, which required consumers to have digital certificates — the equivalent of signed credit cards — on their desktops. SET has failed to gain popularity with banks and merchants because SSL is easier to use.

But some observers said IBM missed the mark by requiring consumers to download the software to their desktops, rather than following the trend toward placing wallets on servers.

Server Access

Other digital wallets can be housed on a server at a secure site such as a financial institution, eliminating the need to download software and order from just one desktop.

"Customers are used to downloading. A download the size of the wallet, 15M bytes, is minimal," said Ralph Hertlein, a product manager at IBM.

Avivah Litan, an analyst at Gartner Group Inc. in Stamford, Conn., disagreed. "The [desktop wallet] model has proven to be too cumbersome for most consumers," she said. Banks and merchants can purchase the software and let consumers download it for free.

MasterCard International Inc. will market IBM's wallet to its 23,000 member financial institutions, said Art Kranzley, senior vice president for e-commerce. Banks can brand the wallets with their names and include banner advertising.

The Consumer Wallet, to be shipped later this year, will be available in 24 languages and cost merchants a flat fee starting at $50,000. ▶

E-COMMERCE

Appliances Target Security

BY ANN HARRISON

Securing electronic business at a lower cost is the aim of a collection of integrated software and hardware appliances announced last week by Network Associates Inc. in Santa Clara, Calif.

The WebShield E-ppliance collection of products offers Web-enabled, remotely manageable versions of the company's antivirus, firewall and virtual private network (VPN) software in the form of plug-and-play hardware appliances. The E-appliance line was unveiled at a keynote session at the Networld/Interop '99 conference in Atlanta.

E-ppliance sits between the local network and the Internet service provider connection to monitor traffic before it reaches the servers. According to the company, E-appliance products have achieved scalability that's often lacking in appliances and offers greater ease of use and setup than current configurations. Unlike other appliances that integrate Web and e-mail servers, E-ppliance focuses strictly on security. Network Associates also claims that it's the first appliance that protects against computer viruses.

Appliance technology promises that information technology managers will be able to secure networks more cheaply, easily and with reduced ongoing service and support. Network Associates said its E-appliances will build on the company's Active Security Strategy, which integrates its existing security products to work together through a central event manager.

WebShield E-ppliances for Solaris and Windows NT platforms will be available by year's end. They will include the WebShield 100 E-ppliance for antivirus scanning and the WebShield 300 E-ppliance, which integrates McAfee antivirus, Pretty Good Privacy VPN and Gauntlet firewalls. Pricing will be announced upon shipment. ▶

Last Major Windows 2000 Beta Ships

Any other fixes are expected to be minor

BY DAVID ORENSTEIN

MICROSOFT last week shipped the last major beta-test of Windows 2000, the latest public version of the operating system that observers said seems just about ready to go.

Release Candidate 2 (RC2) represents the last time Microsoft Corp. plans to make any major changes in Windows 2000. A third release candidate is possible, said Keith White, director of the company's business and enterprise division, but any fixes resulting from it will be minor.

In RC2, the company addressed about 10,000 bugs and work items such as unhelpful error messages that beta-testers identified in RC1, White said.

Major areas of focus in the more than 30 million lines of code were improving application compatibility, simplifying Internet connections and domain name server (DNS) configuration, cleaning up the user interface by removing unnecessary items and shipping more reliable and plentiful hardware drivers.

Testers said that Windows 2000 has basically taken shape since RC1.

Alan Williams, director of distributed systems at Pennsylvania State University in State College, Pa., said Windows 2000 Professional looks solid, but the Active Directory and DNS features have bugs. He said Microsoft is aware of the problems, which he declined to specify.

It Looks Ready

Bob Friedman, CIO at 800-777-Club Inc., a financial and communications services provider in El Monte, Calif., said Windows 2000 looks ready to him.

"This thing's been tested to death," Friedman said. RC2 is the fifth beta release in two years. Microsoft has a reputation for sometimes releasing software with bugs that should have been fixed, he said. "Getting over that stigma will be difficult, but not for me — I'm sold on it."

Wait Till Next Year

But he may not see a final product until next year, unless Microsoft can manage to finalize its code and release it to manufacturing in the next few weeks, said analyst Matthew Nordan at Forrester Research Inc. in Cambridge, Mass. Hardware vendors don't expect to ship systems with Windows 2000 until next year, he said.

But Nordan said it's a good sign that Microsoft is now paring down the features list. Since that stage has been reached, he said, it's clear that the company is satisfied with the product technically.

Microsoft said last week that two performance-enhancing technologies — component load balancing and in-memory database hosting — will not ship with Windows 2000. ▶

KMWorld Agenda: Ease of Use, Better Search Tools

BY DOMINIQUE DECKMYN

At the KMWorld '99 show, which opens in Dallas tomorrow, users will be on the lookout for better search technology, less complex knowledge management technology and Extensible Markup Language (XML) tools.

Shereen Remez, chief knowledge officer at the U.S. General Services Administration, said knowledge management technology should be less cumbersome to users. For instance, it should be able to capture and classify the information that users send via e-mail. "That information is now being lost," said Remez.

Classification

Better classification and search tools are sorely needed, said Sara Radicati, president and CEO of Radicati Group Inc., a Palo Alto, Calif.-based research firm. Vendors like San Francisco-based Autonomy Inc. are leading the way in this area, said Radicati.

Susan Hanley, director of knowledge management at American Management Systems Inc. in Fairfax, Va., is on the lookout for technology that will help people connect to other people in the enterprise by profiling workers' expertise.

Orbital Software Group Ltd. in Edinburgh is aiming to fill that need with the launch this week of Organik PeopleFinder 1.0. The Windows NT-based tool will scan existing information in e-mail, Lotus Domino databases and other information sources and automatically map the knowledge held by people in an organization into simple categories, Orbital claims.

Another technology users are looking out for at the show is XML, the upcoming standard that will make it easier to classify and retrieve information by bridging the gap between structured and unstructured data. ▪

View of Microsoft DNA Remains Fuzzy

Internet standards are essence of initiative

BY DAVID ORENSTEIN
SAN FRANCISCO

Microsoft Corp.'s new model for Internet application development, Windows DNA 2000, won some initial praise from users and analysts, but some hastened to add that the plan remains fuzzy.

Company President Steve Ballmer said future development on the Web will be based on application components that use the industry standards Extensible Markup Language (XML) and HTTP to interoperate. Reliance on those standards could free developers to incorporate components in their applications regardless of platforms or middleware, analysts said. In this model, components could reside anywhere on the Web and still be used in an application.

A key product for the new model, the BizTalk server, translates documents in and out of XML and other formats and routes them according to user-defined rules.

BizTalk is the backbone of an architecture under development at the British retail giant Marks & Spencer.

Using BizTalk alpha code, the company is developing a system that will give employees and suppliers a real-time view of sales data at its more than 300 British stores, according to Mike Yorweth, project manager of information technology shared services at the $13 billion company.

At a demonstration here last week, Ballmer and Paul Maritz, vice president of Microsoft's developers group, said a suite of server products, including new versions of Commerce Server and SQL Server, will debut next year to support the model on Windows.

Microsoft plans to offer several such publicly exposed Web components, or megaservices. The first one is Passport, which would identify people on the Web, allowing them to be authenticated and then make purchases with financial information attached to their identities.

But Yorweth said Marks & Spencer wouldn't want to expose a service to the general public, but instead to partners who have yet to be identified.

"This XML-based, loosely coupled federation of applications is exactly where it should go," said Larry Perlstein, an analyst at San Jose-based Dataquest, a unit of Gartner Group Inc.

However, Perlstein added that XML still has to be properly written and formatted to achieve universality.

Meta Group Inc. analyst Melinda Ballou said XML doesn't have essential services offered by full component models, such as transactions, security and persistence. "They didn't discuss how to integrate with those other services," she said. ▪

BALLMER: Future Web development will be based on components that use XML and HTTP to interoperate

DNA Engineering

Microsoft's plans for its DNA 2000 architecture include:

BIZTALK SERVER Translates documents in and out of XML and routes them according to user-defined rules.

SQL SERVER A new version will include support for streams of XML content.

SNA SERVER Code-named Babylon, the host integration software will include XML integration capabilities.

WINDOWS 2000 Application servers such as message-queuing support for XML will be included.

APP CENTER SERVER A tool for managing load balancing and fault tolerance in clusters of Windows 2000 servers

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Microsoft, Novell Tackle Bandwidth

Management approaches set policies for applications, users on Win 2000 networks

BY DAVID ORENSTEIN

MICROSOFT Corp. and Novell Inc. last week offered new and different ways to manage bandwidth with policies on Windows networks, but users said having ample capacity is the best way to handle quality-of-service issues.

At Networld/Interop '99 in Atlanta, Microsoft and Cisco Systems Inc. showed off an interface in Windows 2000 that will let developers build applications with different network priorities. Novell, meanwhile, announced a firewall for Windows NT that allows administrators to assign priority to different users via Novell Directory Services (NDS).

But David Hamilton, senior software adviser at Reuters Ltd. in El Segundo, Calif., said his company manages bandwidth and quality of service at the router level with Cisco's tools alone.

"If a developer has the ability to throttle traffic, he or she will, and that is always a bad idea," Hamilton said.

Building Bandwidth

Hamilton said the global provider of financial information gives stock ticks priority over news on its network, for example, but uses quality-of-service techniques judiciously. The company is investing heavily in laying T1 lines to beef up the available bandwidth to its customers.

The manager of a 2,500-user network at the U.S. office of a major Japanese auto manufacturer said that his company hasn't employed quality-of-service management technology. Instead it has tried to invest in its network to ensure that users have adequate bandwidth. Employing policy-based management would require the company to identify who will make those decisions.

Although some users balked at the decisions, analysts said the announcements would benefit the still-emerging field of policy-based bandwidth management. Elisabeth Rainge, an analyst at research company International Data Corp. in Framingham, Mass., said that because some corporate IT departments will want to provide Windows developers with the capability to claim adequate bandwidth for applications, Microsoft and Cisco are right to provide the capability.

Phil Schacter, an analyst at The Burton Group in Midvale, Utah, said using directory software can be helpful for bandwidth and security management. By integrating with NDS, Novell's NT firewall, for example, would let administrators manage users by name rather than IP address, a particular benefit on networks where users frequently change IP addresses. ▶

New Handhelds Hold Corporate Promise

Palm Computing founders take on their old company

BY MATT HAMBLEN

Last week's unveiling of a new, less expensive alternative to the PalmPilot is a sign that more and better handhelds are coming for corporate users, analysts said.

Handspring Inc. in Mountain View, Calif., last week announced the Visor handheld, which analysts said could be useful for corporate and vertical applications because of its built-in expansion slot.

Analyst Rob Enderle at Giga Information Group Inc. in Santa Clara, Calif., said the Visor is "arguably better at lower cost" than the PalmPilot, especially with the proprietary expansion slot that allows integration of wireless modems, full-size keyboards and other devices.

Handspring was founded

Handspring's Visor

Price: Starts at $149 ($179 with synchronization cradle)

Size: 4.8 by 3.0 by 0.7 in.; 5.4 oz.

Features: Palm operating system; Springboard expansion slot (in rear) for integration of Springboard modules, which are sold separately; built-in microphone; runs address book, date book, to-do list, e-mail applications, world clock and calculator.

last year by Donna Dubinsky and Jeff Hawkins, founders of Palm Computing Inc. The Visor uses the Palm operating system.

From a design and price perspective, the $149 Visor and its Springboard expansion slot seem aimed at the corporate buyer, analysts said. But Handspring, with 40 employees, has no corporate sales force or plans to chase that market, a Handspring spokesman said. For now, the Visor will be sold over the Web, with retail store sales starting early next year.

"Even though Handspring isn't chasing corporate buyers, it certainly could be a lower-cost alternative for certain vertical applications," said Phillip Redman, an analyst at The Yankee Group in Boston. For example, the Visor could be attached to a thermometer to automatically record patients' temperatures.

Even as Handspring focuses on consumers, analysts predicted that Palm Computing will abandon the consumer market and go after more lucrative corporate sales, selling wireless services and packaging e-mail applications with PalmPilots, which will drop in price later this year. Palm Computing is being spun off from Santa Clara, Calif.-based 3Com Corp. (see story, page 26).

Other Market Moves

In addition to the Visor and the new focus on the enterprise by Palm Computing, the handheld market is expecting other moves, Enderle said. Symbian Ltd. in London plans to add computing capabilities to cellular phones. It also plans to develop a larger handheld with a keyboard running its Epoc operating system, which will be a direct competitor with the Jupiter-class machines from Windows CE, he added.

And Wireless Knowledge in San Diego, a Microsoft-Qualcomm Inc. alliance, is expected to announce a wireless platform by year's end, Enderle said. ▶

Microsoft Takes Instant Chat to Handheld Devices, Phones

BY DOMINIQUE DECKMYN

Instant messaging moved a step closer to its promise — some might say the nightmare — of providing a single way to reach anyone at any time, via PC, handheld computer or cellular phone.

Microsoft Corp. announced last week that it would extend its MSN Messenger instant messaging software to Windows CE devices, WebTV and cell phones. It didn't say when the service would be available. The company also launched a Macintosh version of the messaging software.

Microsoft will extend its recently launched MSN Mobile Service to instant messaging. The service currently delivers news and stock quotes to cellular phones and pagers.

America Online Inc., which is involved in a battle over instant messaging standards with Microsoft, is currently beta-testing a version of AOL Instant Messenger for Windows CE.

The company is also considering a version for Palm handhelds but hasn't announced plans for wireless access to its service.

Instant Messaging at Work

Integrating instant messaging with Windows CE handheld devices struck a chord with Howard Jones, vice president and CIO at lawn mower manufacturer Snapper Power Equipment in McDonough, Ga., which plans to use Windows CE devices on its plant floor. He said there are advantages to his workers being able to instantly communicate with each other using the CE devices.

Snapper is planning to implement Platinum, the next version of Microsoft's Exchange server, which is scheduled to ship in the first half of next year and will include a corporate version of MSN Messenger.

Separately, Seattle-based Tegic Communications Inc. has created its own instant messaging client for cellular phones that it claims will be compatible with both AOL and Microsoft products through the carrier networks. The company will field-test its software in November and could have the software embedded in cell phones in the first quarter of next year.

Instant messaging will be part of Tegic's T9 technology, which makes it easier to type text messages on a numeric keyboard. The technology recently started shipping in phones from Nokia Corp. in Irving, Texas, and Motorola Inc. in Schaumburg, Ill., among others.

"I think instant messaging is going to be on all sorts of devices, and it will be as ubiquitous as the phone," said David Ferris, president of San Francisco-based Ferris Research. ▶

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Poll: Most Businesses Concerned About Piracy

But software costs too much, some say

Software Worries

What issues are important to software managers?

Data security	**82%**
Year 2000	**77%**
Training for new technology	**73%**
Software piracy	**56%**
E-commerce	**36%**

Base: Survey of 776 companies

BY MATT HAMBLEN

A NEW POLL found that only a slim majority of businesses say software piracy is an important issue, prompting software vendors to find ways to heighten concern.

In a survey of 776 North American businesses that was released last week by the Business Software Alliance (BSA), 56% of respondents said it's important to be informed about piracy. But it ranked fourth on a list of priorities, behind data security, year 2000 work and training employees in new technology.

"We wish we were higher in importance, and when year 2000 is over, we hope to move up to third," said Melinda Brown, vice president and general counsel at Lotus Development Corp., one of 12 BSA members.

In coming months, the Washington-based group is going to focus on getting businesses to comply with software licensing, as well as urge governments to crack down on pirates, Brown said.

Karine Elsen, BSA's marketing director, said that historically it's been tough to get companies and their employees to see that duplicating software without paying for it is a crime.

However, she said, that attitude is changing, and more companies have policies than five years ago. The poll, conducted in the spring, showed that 75% of those surveyed had a software-usage policy.

But Dwayne Poeppel, systems manager at general contractor E. Ken Halverson Inc. in Redmond, Wash., said he's somewhat unsympathetic to antipiracy efforts because software costs too much and is constantly upgraded.

"It's a hassle dealing with software vendors, and you say, 'The hell with them,' and you get tired of paying for all these updates," Poeppel said. "It's hard to tell my boss I need $500 for software that one user will use once or twice a year."

But the company is finalizing a formal piracy policy, and Poeppel said he works hard to ensure that he has enough authorized licenses.

At Kansas City Life Insurance Co., policy forbids workers from downloading software, said Robert Easton, senior applications systems manager. "We do our best to control things," he added. ▶

MOREONLINE

For resources and articles related to software piracy, visit our Web site.
www.computerworld.com/more

Intel Offers Hardware-Based Encryption Device for LANs

Security NIC helps stop theft on LAN

BY SAMI LAIS
ATLANTA

With a chip set that Intel Corp. announced at Networld/Interop '99, network security managers will be able to remotely manage hardware-based encryption services at users' desktops.

The chip set, which combines Intel's 82559C Fast Ethernet Controller and 82594ED Network Encryption Co-Processor, will be incorporated into adapters and motherboards to encrypt and decrypt communications over LANs.

The concept isn't new. Although Intel plans to ship devices by year's end, 3Com Corp. in Santa Clara, Calif., is already shipping a network interface card with hardware-based encryption.

"Where this would be useful is for remote or home office work areas where you have data traversing unsecured lines" to the LAN, said Charles Smith, information systems manager at AirTouch Cellular in Dublin, Ohio. However, large networks would more likely use dedicated servers or virtual private networks to provide such security, he said.

In addition, "senior management, who handle documents that have more strategic importance might be interested," said Michael Taylor, risk manager at a large brokerage firm in San Francisco.

According to the 1999 Computer Security Institute/FBI Computer Crime and Security Survey of 521 security professionals, 26% of responding security managers reported security breaches, which resulted in losses that totaled more than $100 million last year. And 45% of security crimes came from within the firewall.

A co-processor on Intel's new chip will accelerate encryption, speeding processing time for 56-bit Data Encryption Standard (DES) by 133% and for 168-bit DES by 250%, a company spokesman said.

"Those who have a need for encryption capabilities not infrequently say, 'We need to speed this up,'" said Eric Hemmendiner, an analyst at Aberdeen Group Inc. in Boston. "But if they're serious about it, they go out and get a dedicated server — a hardware-based solution." ▶

Internet Time

According to information technology executives from online businesses who attended a recent Hewlett-Packard Co. e-commerce show, it takes data-center-like discipline to build the technology infrastructure for a reliable Web business, but it takes a slightly different mind-set to keep pace with its growth.

"It's like being able to rebuild a 747 while it's flying," said Alan Fisher, chief technology officer and co-founder of Onsale Inc., a Menlo Park, Calif.-based online retailer of electronic goods.

Data center capabilities such as backing up and recovering data, testing applications and ensuring high availability of applications remain vital, said John Street, president and CEO of USA.Net Inc., an Internet-based e-mail and messaging service in Colorado Springs.

On the Web, the trick is to do those things in a highly visible, fast-growing and continuous environment, Street added.

"The cost, the reliability, the number of customers you reach and the ability to change is operating at a pace that is radically different" from traditional IT operations, said Lewis O. Wilks, president of Internet and multimedia markets at Qwest Inc., an application hosting service in Denver.

IT executives said running a business on Internet time means doing the following:

■ Breaking large applications into smaller components. Having an architecture that lets administrators add, remove, test or repair hardware and software — without taking the complex down.

■ Buying off-the-shelf software when possible and layering customization on top of that.

■ Distributing workloads over multiple servers, storage devices and networks to eliminate single points of failure.

■ Being prepared to add hardware — lots of it, and quickly.

■ Upgrading software in increments, when needed.

"Don't go for the big-bang rollout. Those that wait to build the perfect platform before deploying it will be left in the dust" by more nimble rivals, said Bobby Lent, vice president of strategic alliances at Ariba Technologies Inc., a Sunnyvale, Calif.-based provider of business-to-business e-commerce services.

Instead, deploy functionality when it's reasonably tested and strengthen it on the fly, he said.

With hardware, the key is to buy more than you think you need, then use technologies like load-balancing software and switches to distribute applications as widely as possible, said Jay Chavez, vice president in charge of a new online telephony service from Ursus Telecom Corp. in Sunset, Fla. "I built the whole thing so ridiculously huge, I really had to convince management I needed as much equipment as I did," Chavez said.

The reason: Unpredictable growth makes capacity planning on the Web more an art than a science, said Maynard Webb, CIO at Internet auction house eBay Inc., in a recent interview [Technology, Sept. 13].

"We try to do a reasonable job of testing what we install," given the time-to-market constraints of competing online, Webb said. "In the end, you just have to be a lot smarter about managing what you have." ▶

JUST THE FACTS

Keep It Going

Some things Onsale.com does to keep its site running and growing:

■ **Modular architecture:** Core application broken up into 64 components, so administrators can repair things without shutting down everything.

■ **Availability:** Mirrored servers, mirrored data and four different backup methods to minimize accidental loss of data.

■ **Testing:** Ten quality-assurance specialists assist the software development team in rolling out new software.

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NEWS

BRIEFS

Tax Decision Delayed

The Advisory Commission on Electronic Commerce met last week in New York to recommend answers to the Internet tax problem. But the group has yet to reach consensus on how and whether to tax Internet sales.

The 19-member panel, made up of state officials, telecommunications firms and Internet companies, is scheduled to meet again in December in San Francisco. Its report to Congress is due in April.

Year 2000 Hoax Mail

Microsoft Corp. last week sought to warn users that an e-mail hoax that appears to come from Support@Microsoft.com contains a Trojan horse that extracts passwords and user names from a machine when an attachment is executed. The message ostensibly relates to Y2K issues.

Floyd Nixes FTC Event

The Federal Trade Commission will hold a press conference Wednesday to announce details on what it is calling "a new Internet scam," as well as a high-tech Internet lab, according to a statement. The press conference had been scheduled for last Thursday but was postponed because of Hurricane Floyd.

Amdahl's New EnView

Amdahl Global Solutions, a division of Amdahl Corp., last week introduced a new version of its EnView application performance monitoring software. The EnView 3.1 release lets users access performance information over Netscape browsers. EnView monitors client/server and mainframe applications. Pricing for the software starts at $19,500.

Gates Donations

The Bill and Melinda Gates Foundation last week allocated $1 billion for full college scholarships for minorities. The amount will provide $50 million per year for 20 years to a total of 20,000 students. The allocation follows more than $5 billion worth of endowments to the $17 billion foundation by the couple this year.

Government Reports Warn Of Y2K Problems Abroad

Ukraine, Russia among hot spots

BY THOMAS HOFFMAN

REPORTS released last week by the U.S. State Department and its British counterpart warn would-be travelers about possible year 2000-related problems with power, heat and medical services that could occur in certain destinations.

But both reports stop short of advising travelers to cancel their trips.

Taskforce 2000, a British government Y2K agency, is advising people not to travel to certain countries (see chart) for five weeks surrounding the changeover period unless absolutely necessary.

Trouble spots listed in the British report, which can be found at www.fco.gov.uk, include Ukraine, where the nation's infrastructure is cited as vulnerable, and Russia, where nuclear power plants may run into problems.

For example, the British report states that there are 3,904 information technology systems in Russia's nuclear energy industry, and 42% of them are date-sensitive.

A possible bright spot in Russia: The deputy director in charge of year 2000 work at RAO United Energy System, the electricity distribution monopoly, said that because Russian electricity consumption is only 70% of 1991 levels, excess capacity could help the organization meet power demands if any power plants suffer Y2K-related outages.

The U.S. State Department report (http://travel.state.gov/travel_warnings.html) is a compilation of briefs filed by U.S. embassies in each of these nations. Agency officials said it wasn't their job to "analyze" the information, nor were they willing to single out nations that may be at risk.

Sen. Robert Bennett (R-Utah), chairman of the Senate Special Committee on the Year 2000 Technology Problem, denounced the State Department's report, saying it "barely scratches the surface of serious year 2000 problems facing many countries around the world."

Because many airlines, railroads and other transportation carriers have already begun cutting back on service during the year 2000 changeover, "it's going to become increasingly difficult" for people to travel if they don't leave before mid-December, said Capers Jones, chairman of Software Productivity Research Inc., a consultancy in Burlington, Mass.

On the Radar Screen

Countries where year 2000 glitches are possible:

JAPAN Japan's Ministry of Health & Welfare has published a list of 1,297 medical devices that could be date-sensitive. However, only 19% of Japan's emergency rooms had tested this equipment as of June 30.

CHINA Faces potential disruptions in areas such as banking and finance, telecommunications, medical services, electric power and infrastructure services outside coastal cities, which are generally well-prepared.

RUSSIA Strong likelihood of Y2K problems affecting electricity, heat, telecommunications, transportation, financial and emergency services.

ARGENTINA Low risk of problems with financial services, telecommunications and power, but hospitals are at a higher risk because services are provided at the provincial and municipal levels, where Y2K preparedness hasn't been as advanced.

SOURCES: U.S. STATE DEPARTMENT (HTTP://TRAVEL.STATE.GOV/TRAVEL_WARNINGS.HTML)
BRITAIN'S FOREIGN & COMMONWEALTH OFFICE (WWW.FCO.GOV.UK)

MOREONLINE

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2002 Too Soon for Next-Day Settlement

Wall Street worries about 'unrealistic' SEC deadline

BY MITCH BETTS
WASHINGTON

A panel of securities industry officials last week had just one word to describe the government's deadline for achieving next-day settlement of trades: unrealistic.

The chairman of the U.S. Securities and Exchange Commission (SEC) has called on the industry to clear and settle all trades within 24 hours — or T+1, which means "trade plus one day" — and to do that by June 2002. It will require a major overhaul of brokerage information systems, which now meet a 72-hour requirement.

In essence, T+1 will force a switch from Wall Street's traditional batch processing systems to a real-time processing network that never crashes [News, July 5]. The industry supports the T+1 goal but sees the June 2002 deadline as too ambitious for such a big undertaking.

"So much re-engineering is required that it may be difficult to meet that date," said Dennis Dirks, president and chief operating officer at Depository Trust Co., a stocks and bonds clearinghouse in New York.

Patrick Campbell, executive vice president and chief operating officer at The Nasdaq Stock Market Inc. in Washington, agreed. "We've got to have a date. ... But let's get a date that's reasonable," he said.

The Securities Industry Association's T+1 committee will propose a new timetable to the SEC.

Dirks and Campbell spoke at a conference here sponsored by San Francisco-based Advent Software Inc., which makes software for the securities industry.

DENNIS DIRKS: Major re-engineering required for T+1

The industry is undergoing major changes, with a constant series of rush-rush projects to prepare its information systems for the euro, the year 2000 date rollover, online trading, decimal stock prices, extended trading hours and T+1.

In an industry survey, 250 securities firms said they expect to collectively spend a total of $500 million to achieve T+1. But Robert Iati, an analyst at TowerGroup in Needham, Mass., suggested the final cost will be $1.5 billion to $2 billion.

Iati said securities firms will need to "bullet-proof" their systems because there won't be much time in the T+1 window for glitches, error corrections or slow or down systems. Other speakers said processes now handled on the phone or by fax will have to be automated to meet T+1 time constraints.

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SAP Beyond R/3

to put some real meat on the bones of its non-R/3 software.

By year's end, new products and upgrades are due for release or beta-testing in all those application areas plus high-level business analysis, said SAP executives at last week's Sapphire '99 user conference here.

For example, an upgrade of SAP's data warehousing software that's supposed to be able to run full-blown corporate decision-support systems is scheduled to become available for testing by users in November. And SAP plans to ship its first two CRM applications and start testing four more in the fourth quarter (see chart).

The developments are being watched carefully by many R/3 users who are relying on SAP to help them avoid the pitfalls of tying together applications from different vendors.

"Our philosophy is that the less parties you're dealing with, the better," said Ed Toben, CIO at New York-based Colgate-Palmolive Co. "We're depending on SAP's [developers] to get us to the right place."

The consumer products maker began using SAP's supply-chain tools last spring and plans to turn on an initial in-

COLGATE'S ED TOBEN:
The fewer vendors you deal with, the better

stallation of its Business Information Warehouse software for data warehousing next month, Toben said.

Eastman Kodak Co. was one of the first R/3 users to install Business Information Warehouse. The Rochester, N.Y., film maker went live with the data warehousing package in April and has more than 350 workers using it to read finance and sales reports.

Features Needed

But for now, Kodak is using Business Information Warehouse as "a very tactical tool" to eliminate some old mainframe-based reporting systems, said Eric Hunt, manager of the company's global data warehouse project. The software needs to be beefed up with new features such as a link to Web browsers and improved query capabilities before Kodak can build a full-fledged data warehouse, he added.

Many of the needed additions are supposed to be in the Version 2.0 upgrade SAP has in the works, Hunt said. "The plans are all there, so I'm betting on this happening," he said. "But you really need to get your hands on it before you can [tell]."

SAP officials said more than 800 users have bought the data warehousing software, but only about 80 of those compa-

In the Works at SAP

BUSINESS INFORMATION WAREHOUSE: Version 2.0 upgrade due for beta-testing in November. New features include the abilities to read reports from Web browsers and to drill down into R/3 to look up detailed transaction data.

ADVANCED PLANNER & OPTIMIZER: Version 2.0 upgrade of supply-chain planning tool due for shipment next month with a redesigned user interface. New collaborative planning module should also be ready for beta-testing then.

CUSTOMER RELATIONSHIP MANAGEMENT: Field sales and service applications due for shipment this fall. Beta-testing scheduled by year's end on four other products, including software for selling products via the Internet.

STRATEGIC ENTERPRISE MANAGEMENT: First release of new analysis applications for measuring corporate business performance and doing high-level strategic planning due for beta-testing by year's end.

nies have gone live so far. The Advanced Planner & Optimizer supply-chain tool released earlier this year has been sold to about 140 users, SAP said. But only 11 are running it now, and half the buyers don't have projects under way yet.

Raytheon Aircraft Co., a maker of small and midsize planes in Wichita, Kan., bought Business Information Warehouse when it was first released last year. But the product "wasn't ready for prime time at that point," said John Ferney, Raytheon's project manager for a rollout of R/3 and other SAP applications.

Raytheon, which plans to complete its 4,000-user R/3 installation in January, decided to postpone the data warehousing implementation and wait for Version 2.0, Ferney said.

That hasn't diminished Raytheon's interest in the R/3 add-ons — it's also testing SAP's supply-chain software and evaluating the upcoming business analysis applications. "At the end of the day, it's the integration [that's important]," Ferney said. "What you might give up in functionality ain't worth fighting about."

But other users want SAP to prove that its software can stand up to rival products.

Christopher Lynch, manager of manufacturing systems at Brush Wellman Inc., said the Cleveland-based maker of metals and other materials will likely match applications such as Business Information Warehouse against other packages.

SAP's software would be the

Bundles to Offer Customization

Another key cog in SAP's attempt to move beyond the back office is a long-promised software repackaging, centered on a Web-based business portal that's supposed to be ready for beta-testing next week.

The mySAP.com packaging strategy was announced last week at Sapphire '99, as expected [News, July 26]. Pieces of R/3 and SAP's other applications are being combined into bundles tailored for different kinds of workers. End users will be able to launch all the products – plus non-SAP software – from the workplace portal's user interface.

Kevin McKay, CEO of SAP's U.S. operations in Newtown Square, Pa., said the price of the mySAP.com bundles will be "slightly higher" than what SAP now charges for the applications on an individual basis because of the addition of the portal.

But the new pricing hasn't been finalized yet, McKay added. "We'll work with customers on that over the next few months to see how valuable the [portal] is perceived to be," he said. *– Craig Stedman*

most palatable "because integration is such a bear," Lynch said. "But there are other products that might be more mature." ▶

Crypto Ban

"This will allow us to export all of our security products to markets around the world," said Kelly Blough, director of government relations at Network Associates Inc. in Santa Clara, Calif. "If you look at the potential for sales in the security market to support electronic commerce, you are looking at billions of dollars of sales opportunities out there."

Details of the technical review haven't been revealed. The government has until Dec. 15 to codify the recommendations, which will then go into effect. Companies will still need to report encryption exports in excess of 64 bits and will be barred from sales to seven nations the government says are supporters of terrorism: Iran, Iraq, Cuba, North Korea, Libya, Syria and Sudan.

Ram Varadarajan, vice president for research and development at Palo Alto, Calif.-based Arcot Systems Inc., which sells Internet authentication products, said software developers could already build products around strong cryptographic algorithms available for free at the volunteer-run Web site *www.openssl.org*.

And an information systems manager at an international airplane manufacturer said he doubted the policy change would have much impact on large businesses, given technology already available. "Let's be real. If someone wanted to buy the software [with strong encryption], they could do it and hand-carry it out of the country, and nobody would notice. There is so much bootlegging of software that anyone who has wanted to get their hands on these encryption products could," said the manager, who asked to remain anonymous.

But Varadarajan said the White House announcement would allow his company to ship a complete product instead of making overseas customers search for their own high-level encryption. "We can support larger public-key sizes and ship an entire solution in-

stead of [a product] without crypto libraries in it," said Varadarajan.

U.S. technology companies and legislators have been pushing to overturn the export restrictions, which they say undermine global competitiveness and the expansion of e-commerce and online privacy. Until now, those arguments have been overruled by law enforcement agencies, which argued that strong encryption would be exploited by terrorists and criminals.

In its announcement today, the administration said the FBI's Technical Support Center will receive $80 million to help federal, state and local law enforcement investigate alleged use of encryption by criminals. The Cyberspace Electronic Security Act would allow law enforcement officers to go to court to access decryption keys held by third parties.

Lusan Chan, a policy analyst at the Center for Democracy and Technology in Washington, said the administration has used export controls as a way to compel mandatory key recovery and plain text access to encrypted information.
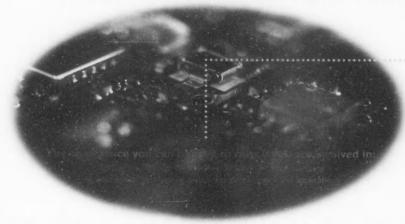
"Now that they realize that approach in the dynamic of the marketplace has become outdated, they are focusing on law enforcement access. We are concerned they are using this concession as a way to expand current law enforcement activity," said Chan. ▶
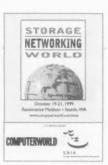
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Left to right: Compaq AlphaServer, Compaq ProLiant, Compaq NonStop Himalaya

Better answers.

NEWS

Microsoft, Government File Rebuttals With Court

Both sides prepare for final courtroom confrontation later this month

BY PATRICK THIBODEAU
WASHINGTON

EACH SIDE in the Microsoft Corp. antitrust case recently filed blistering rebuttals to the other side's version of the facts. It was a prelude to the final courtroom confrontation scheduled for later this month, when closing arguments will be heard.

The Sept. 10 briefs were rebuttals to the voluminous "findings of fact" that were filed Aug. 10. The findings outlined each side's version of key factual pieces of evidence generated during the trial.

Microsoft said the government's findings "are rife with internal inconsistencies" and include "stunning concessions" that undermine the government's claims that the company is a monopoly engaged in anticompetitive practices.

The government said Microsoft's filing "ignored most of the evidence against it" and "mischaracterized much of the evidence that is not ignored."

U.S. District Court Judge Thomas Penfield Jackson will use those briefs to issue his own findings as early as next month. That document won't be a verdict, but it's expected to clearly signal Jackson's inclination in this case.

Market a Windows Ally?

Microsoft also used the rebuttal to introduce new evidence in its continuing effort to show that Windows is under attack and that Microsoft doesn't have a controlling monopoly in the desktop operating system market. Microsoft asked the court to consider Round Rock, Texas-based Dell Computer Corp.'s Aug. 9 announcement that it will offer Linux as an option on two of its desktop and notebook lines.

Moreover, Microsoft also pointed to Linux maker Red Hat Software Inc.'s initial public offering (IPO) last month, noting that a press report characterized the Research Triangle Park, N.C.-based company's IPO as a "spectacular debut."

"The marketplace is Microsoft's greatest ally, given the ease of entry and distribution," said Hillard Sterling, an attorney at Gordon & Glickson LLC in Chicago. But these latest developments aren't "the same blockbuster event" that the merger of Netscape Communications Corp. and America Online Inc. was, Sterling said.

Judgment Day

The two sides meet again Sept. 21 for closing arguments. This could be an important event if Jackson grills the attorneys on both sides.

"That day is only interesting if Jackson comes armed with his list of tough questions for each side and essentially controls the discourse," said William Kovacic, a law professor at George Washington University in Washington.

In its rebuttal, Microsoft said the charge that the company is a monopoly is "utterly at odds" with the government's assertion that "middleware" such as Java or Netscape's browser is a potential threat to Windows.

The government's response: Microsoft advances "the remarkable argument" that "because Microsoft felt it necessary to act to crush potential competitive threats, this means that Microsoft could not be a monopolist since a monopolist would not face competitive threats in the first place." ▶

Microsoft's Busy Legal Summer

Microsoft events since the antitrust recess include:

July 1 Several news sources report that the Securities and Exchange Commission is investigating Microsoft's accounting practices.

July 7 A U.S. District judge in Salt Lake City strikes down Microsoft's effort to block antitrust suit filed by Caldera Inc.

July 16 Microsoft becomes the first company in history to be valued at more than $500 billion; a federal jury in the Bristol Technology case rules that Microsoft didn't violate antitrust laws in its dealings with Bristol but awards Bristol $1 for an undisclosed "deceptive act" by Microsoft.

July 29 A Department of Justice spokeswoman says the DOJ has contacted experts to analyze a potential breakup of Microsoft should the government prevail in the antitrust trial.

Aug. 10 Microsoft submits a 450-page summary of its proposed findings of fact; the government files its own 800-page document.

Aug. 23 A panel of federal judges strikes down a March injunction in favor of Sun Microsystems Inc., which required Microsoft to conform its operating systems, browser and development tools to the Java Native Interface.

Sept. 10 Microsoft and the government file revisions to their findings of fact documents.

Health Care Looks for Security Standards

But guidelines make compliance difficult

BY STACY COLLETT
GAITHERSBURG, MD.

New federal standards for keeping electronic health information secure are expected to be handed down by the end of this year. When that happens, health care providers and software vendors will have a new threat on their hands — getting sued if a patient's confidential data is lost or stolen.

So health care software vendors are sifting through requirements proposed by the Department of Health and Human Services (HHS), trying to develop an industry standard that can protect them from lawsuits.

The problem is that details of the ruling, to be finalized in December, are unclear and the HHS hasn't determined what will constitute a compliant system, according to observers.

The standards were mandated under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), which also called on the HHS to make recommendations to Congress on how to protect the privacy of health information.

The proposal includes an electronic signature standard, which will verify both the identity of a person signing an electronic health care docu-

Proposed Health Care Standards

SOURCE: U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, WASHINGTON

- A standard code set for identifying insurers and health care providers
- EDI standards for health care transactions such as claims enrollment and reporting diagnoses
- Electronic signature standards to verify the identity of the person signing and the authenticity of an electronic health care document

ment as well as the authenticity of that document. It also requires electronic data interchange (EDI) standards for electronic claims and other administrative transactions, as well as for reporting diagnoses and procedures in the transaction. All health care providers must comply with the new rule by 2002.

"There's a disconnect between policy and implementation," said Lewis Lorton, acting administrator of the Forum on Privacy and Security in Healthcare, an industry group that met here to draft a common security architecture that will be compliant with the new federal regulations.

So far, the forum, which includes IBM, Electronic Data Systems Corp. and Healtheon

Corp., has come up with "protection profiles." These can help health care providers identify the level of security they need based on the technology they use.

But developing specific standards is tough without more clear-cut compliance rules from the government, said Diann Carpenter, technology director at Arca Systems Inc., a health care software vendor in Santa Clara, Calif. "Based on the current rule, most systems are HIPAA-compliant," but that may change when the final document is released, she said.

Also, health care providers are expected to certify their own electronic security readiness, which won't hold water if they're sued.

One provider, the University of Michigan Health System in Ann Arbor, analyzed its security policy when it heard of the pending rules. "Our security policy said employees can't take a box of pens from the supply closet, but we had no policy that said information is an asset within our organization," said Mary Kratz, director of information technology special projects at the health system.

Kratz's team concluded there was limited technology to monitor usage of data and advised the health system to hire a chief security officer to handle IT security issues. ▶

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Businesses Worry About Long-Term Data Losses

Will we access our saved data in 20 years?

BY MITCH BETTS

WE KNOW what Alexander Graham Bell said in the first telephone call: "Mr. Watson, come here; I want you." We don't know what Ray Tomlinson said in the first network e-mail in 1972. He doesn't remember exactly, and he didn't save it.

"The main reason it's lost to history is just that it didn't seem worth saving [at the time]," said Tomlinson, principal engineer at GTE Corp.'s BBN Technologies unit in Cambridge, Mass.

In retrospect, it would be nice to have that piece of history, Tomlinson said, but you can't save everything — or even recover it. "Even if backup tapes did exist, they might not be readable. They were just mag tapes, and after seven or eight years, the oxide starts falling off, especially from tapes from that era," he said.

There's the rub: Digital information — from the historically interesting to the economically vital — is at risk of disappearing or becoming inaccessible because of the deterioration of storage media like magnetic tapes (see chart). Other culprits include ever-changing data formats and the fact that software and hardware become obsolete quickly.

Major portions of the 1960 U.S. census, for example, could be read only with a Univac type II-A tape drive, which was a museum relic just 16 years after the census, according to a report by the Council on Library and Information Resources (CLIR) in Washington. It took a major data-rescue effort to copy the raw data to industry-standard tapes.

There's a reason it's called "machine-readable" data. Pre-1979 Landsat satellite data is inaccessible, for instance, because it was recorded on ancient Xerox Corp. computers that can no longer be operated, according to the journal *Science*. And just try finding a PC that can read a WordPerfect 4.0 file on a 5.25-in. diskette — and not lose the footnotes or formatting.

Historians, librarians and archivists — who have a natural affinity for really old stuff — are already alarmed about the loss of cultural and government records. But digital preservation is becoming a business issue, too, as certain industries find that they need to keep data longer and longer for regulatory or business reasons.

Pharmaceutical companies are a prime example. They need to keep records about new drugs for as long as the drug is on the market and records about clinical trials for the life span of the patients, said Jeff Rothenberg, a senior computer scientist at the Rand Corp., a think tank in Santa Monica, Calif.

And now companies are spending millions to build data warehouses intended to hold cradle-to-grave records of customer purchases and health care. "We do have concerns that 10 years from now, 20 years from now, what is the likelihood that [the data] will even be retrievable," said Joe Bruscato, chief architect of data warehousing at Anthem Blue Cross and Blue Shield in Cincinnati.

"Companies aren't doing enough to make sure that data that was archived several years ago is retrievable. It's a valid concern," Bruscato said. "Just as companies have disaster recovery plans, they need data recovery plans."

Analysts say the quality of corporate data archives is all over the map, ranging from ideal setups of optical jukeboxes and tapes in climate-controlled vaults to haphazard, undocumented storage of reels in basements. And some companies don't archive at all, figuring employees will print out anything that's really important.

But short-term thinking and sloppy record keeping could lead to data disasters for corporations if they lose valuable information because the magnetic tape decomposed or because they no longer have the software or hardware required to retrieve it.

Besides proper stewardship of storage media, companies need to have a records-management team that maintains a central repository of metadata — sort of a catalog of the company's data and formats — and schedules the conversion to new media, said Wendy Anne Ailor, records manager at a major pharmaceutical company. The trick is to schedule conversions well before the particular storage medium is expected to deteriorate.

Managers should also log the software and hardware versions required to read or manipulate the data — and keep an eye out for discontinued models.

Ailor said her company had 1.5 million image files stored on a Sony Corp. jukebox, but Sony announced two years ago that it would discontinue support for the 12-in. optical platters after next year. So the company is copying the images to 5.25-in. platters from Hewlett-Packard Co.

Companies may need to keep an "application archive," said Kris Newton, an analyst at Strategic Research Corp. in Santa Barbara, Calif. She explained: Users who converted legacy mainframe systems to Unix or Windows NT — perhaps for year 2000 compliance — need to keep a copy of the old applications so they can read the legacy data. And they may need a hardware emulator, because they probably don't want to keep an old mainframe around just for that purpose.

The classic solution to the problem of media decay is to copy the data to newer storage media. But migration isn't perfect.

"As you move material from system to system, there are all sorts of chances for errors — accidental or deliberate — to crop up," said Anne Gilliland-Swetland, an assistant professor of information studies at the University of California in Los Angeles. She's also co-director of a new research project trying to formulate model policies, standards and strategies for ensuring that authentic electronic records can be preserved over long periods of time.

Eye to the Future

The key to designing an archival system is to keep an "eye to the future" with a long-term view, said Kermit Patton, a researcher at SRI Consulting in Menlo Park, Calif.

"Most companies tend to be short term in their perspective, so they're thinking only of getting [data] onto the next generation [of storage media]," Patton said. "If you design the system and data standards while thinking of multiple generations, you're in better shape."
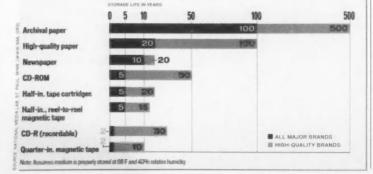
We won't really know how long today's storage media will reliably hold data until we let it age a decade or two. And we won't see whether the data is corrupted or missing until we try to read it.

That's what happened when technicians checked the magnetic tapes holding data from the 1976 Viking mission to Mars: They found that 10% to 20% of the tapes had significant errors, the CLIR report said. The technicians called magnetic tape "a disaster" as an archival storage medium.

"You can see books crumbling, but there's no way of looking at a magnetic tape and seeing errors on it — you have to run the tape. It's very labor-intensive," said Abby Smith, preservation expert at the CLIR. "So we won't know how big the problem is until the first time we go back and try to use that information." ▶

"IT DIDN'T seem worth saving," says GTE's Ray Tomlinson, who sent the first e-mail in 1972

Life Expectancy of Storage Media

Old newspapers last about 20 years; high-quality magnetic tapes can last up to 15 years

STORAGE LIFE IN YEARS

Medium	Storage life (years) — All major brands	High-quality brands
Archival paper	100	500
High-quality paper	20	100
Newspaper	10	20
CD-ROM	5	50
Half-in. tape cartridges	5	20
Half-in., reel-to-reel magnetic tape	5	15
CD-R (recordable)	2	30
Quarter-in. magnetic tape	2	10

Note: Assumes medium is properly stored at 68 F and 40% relative humidity

SOURCE: NATIONAL MEDIA LAB BY PAUL MANN (WWW.NML.ORG)

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Database Vendors Eye Portal Market

IBM, Informix, Oracle providing access to varied data sources

BY ROBIN ROBINSON

WITH AN EXPECTED 350% increase in the enterprise information portal market in the next three years, nobody wants to be left out.

A Merrill Lynch & Co. white paper on the portal market predicts that it will grow from the current estimated $4.4 billion to $14.8 billion by 2002. Portals let employees, suppliers and customers access information from legacy systems, Web servers and unstructured data sources such as video or audio.

Already Developed

Each of the four major database manufacturers has developed a "portal-ready" database.

Informix Corp. offers Foundation 2000, an extensible database that merges the company's relational and object-relational database products. IBM has Universal DB2 and DB2 DataJoiner, variants of DB2 built for managing heterogeneous data sources. Sybase Inc.'s product is Adaptive Server Enterprise 12.0, and Oracle Corp. offers its Oracle8i database.

Database vendors expect corporate users to demand access to Web data around the clock, just as consumers do. For example, multiple federal government agencies across different time zones have used Oracle8i's portal to share common documents, according to Jeremy Burton, vice president of Internet platform marketing at Oracle.

Portals make site management easier. Without them, if users can't get to the data or if the site is difficult to manage, they just create a new site, leading to the proliferation of sites inside some corporations, Burton said.

All the database manufacturers let application developers work with Java or Extensible Markup Language to develop portal sites.

Informix is adding its Visionary graphical development tool to enable nontechnical users to create, navigate and maintain portals. Visionary Release 2.0 will be available in the first quarter of next year and will be capable of accessing any database, not only Informix products, said Anne Douville, executive director of the chief technology office at Informix.

"We want users to be able to view data from lots of places and maintain it from one place," she said. ▶

Agencies Report Y2K Progress

But some lag in making systems compliant

BY KATHLEEN OHLSON

Two dozen federal agencies have reported that 97% of their mission-critical systems are year 2000-compliant, a jump from 93% in June, according to a report issued by the Office of Management and Budget (OMB).

Federal agencies now expect to spend $8.34 billion fixing the Y2K problem, up from $8.05 billion in June, the OMB said.

The report states that of the 24 agencies, 15 have finished 100% of the work on their systems. These agencies include the State, Education, Interior, Labor, Veterans Affairs and Housing and Urban Development departments; the Environmental Protection Agency; the Federal Emergency Management Agency; the General Services Administration; NASA; the National Science Foundation; the Nuclear Regulatory Commission; the Office of Personnel Management; the Small Business Administration; and the Social Security Administration.

Nine large agencies, including the Commerce, Justice, Energy, Defense and Treasury departments, have made progress in making systems Y2K-compliant. They have a combined total of 217 systems that aren't Y2K-compliant, a decrease from 410 systems reported in June, according to the report.

Still Working

Meanwhile, the Department of Defense is the furthest behind, with 169 systems still remaining to be fixed.

The report also said seven out of 43 "high-impact" programs that federal agencies oversee have completed their Y2K work. The OMB defines high-impact programs as those that affect public health, safety and well-being. Programs such as Medicaid won't be finished until year's end. ▶

BRIEFS

Quantum Takes Meridian Leap

Quantum Corp.'s DLT and Systems Storage Group finalized its approximately $90 million acquisition of Meridian Data Inc. last week. Meridian Data, a provider of workgroup network-attached storage appliances, became Quantum's Snap Division. According to Dataquest in San Jose, the entry- and workgroup-level network-attached storage appliance market will grow from $160 million in 1998 to approximately $4.5 billion by 2003.

Judge Nixes One Xerox/HP Lawsuit

U.S. District Judge Michael Telesca last week dismissed a patent infringement lawsuit that Xerox Corp. filed against Hewlett-Packard Co. in May 1998. Xerox had charged that HP used patented Xerox technology in some of its ink-jet printers. Xerox said it will appeal the ruling. The companies still have four patent lawsuits pending against each other.

Oracle Has Strong Quarterly Earnings

In its first-quarter financial report last week, Oracle Corp. matched Wall Street expectations and posted strong revenue and earnings. For the quarter ended Aug. 31, Oracle reported revenue of $2 billion, up 13% from $1.7 billion in the same quarter last year. Net income for the recent quarter was $237 million, up 21% from $195 million in the same quarter last year.

Microsoft Files Late Brief in Java Suit

Microsoft Corp. filed a last-minute court brief in a lawsuit filed by Sun Microsystems Inc. over Microsoft's use of Sun's Java programming language. Microsoft argued that the case should be considered as a contract dispute rather than a copyright infringement case, in which damages could be greater. The judge is reconsidering a November injunction preventing Microsoft from using a Java version in its software that isn't compatible with Sun's version.

3Com Plans Palm IPO for Next Year

Spin-off comes as unit's founders debut rival strategy, products

BY MATT HAMBLEN

PALM COMPUTING, A start-up in 1992 that was acquired and then became part of Santa Clara, Calif.-based 3Com Corp. in a merger, will be on its own again and publicly traded starting early next year.

Analysts and 3Com officials predicted the independent, publicly traded Palm will be better able to provide products and services for corporate users.

An obvious direction for Palm is to target large corporate accounts for new sales, because it already has an installed base of 4 million users, mostly through consumer channels, analysts said. Lures will be corporate discounts, but also low-cost wireless e-mail services using Palm's Palm.net network.

Pressure had been on 3Com to spin off the Palm subsidiary for months, but officials said last week it was finally time, chiefly because Palm has grown so much.

The company doubled its revenue last year, reaching $570 million, roughly 10% of 3Com's revenue.

Analysts said another critical factor was last week's announcement by Handspring Inc. in Mountain View, Calif., of a handheld device called the Visor, which uses the Palm operating system and will be a direct competitive threat to Palm hardware sales (see related story, page 8).

"Palm needed to be split out in order to survive," said Rob Enderle, an analyst at Giga Information Group Inc. in Santa Clara.

Analysts said 3Com profits suffered because Microsoft Corp. especially didn't want to forge networking deals while 3Com was supporting a competitor to the Windows CE operating system.

"You certainly saw a much higher degree of business activity between Cisco and Microsoft than between 3Com and Microsoft," Enderle said.

Jill House, an analyst at International Data Corp. in Framingham, Mass., said the move should help Palm's growth. "It never made sense for Palm to be aligned with the networking functions of 3Com," she said. ▶

Handheld Shuffling

January 1992 Palm Computing Inc. is founded by Jeff Hawkins, with funding from Tandy Corp. and other venture capitalists.

September 1995 U.S. Robotics buys Palm for $44 million and sets up the Palm Computing division.

June 1997 U.S. Robotics merges with 3Com Corp.

July 1998 Jeff Hawkins and Donna Dubinsky, the company's president, leave to form Handspring Inc. The company will create new, consumer-oriented devices for the Palm operating system.

September 1999 3Com announces plans to spin off the Palm division and have it go public. Handspring announces its new handheld, the Visor (see story, page 8).

Microsoft-Visio Deal Drawn

Move will add business graphics software to Office suite's arsenal

BY KATHLEEN OHLSON

In a move to beef up Office applications for knowledge workers, Microsoft Corp. said it will acquire diagramming software maker Visio Corp. in a deal worth $1.3 billion in stock.

Seattle-based Visio makes enterprisewide business diagramming and technical drawing software. Under Microsoft's umbrella, it will become the Visio Division, operating as part of Microsoft's business productivity group. For its most recent quarter ended in June, Visio posted $9.6 million in profits on $50.3 million in revenue, compared with $8.5 million in profits and $44.2 million in revenue for the same period last year.

Visio's products are targeted at general business users, computer professionals and those who create technical drawings. The deal will allow the Visio Division to use Microsoft's marketing muscle to reach more customers, said Jeremy Jaich, Visio's president and CEO. Jaich will report to Microsoft Senior Vice President Bob Muglia when the acquisition is finalized.

Visio will continue to produce its Visio 2000 products, and Microsoft is planning no immediate changes to Visio's operations, company officials said. Microsoft executives declined to elaborate further about any future plans.

Eric Klein, an analyst at The Yankee Group in Boston, said the Visio acquisition gives Microsoft a strong business-graphics software line it has lacked, and it "would be wise to make sure it continues to support Visio products."

An effective move for Microsoft would be to bundle Visio products with its own for business users, Klein said. This would give users a powerful tool for presentations that requires a small learning curve, he added.

Microsoft's chief financial officer, Greg Maffei, said the deal will be finalized at the end of this year at the earliest, pending regulatory and shareholder approval. ▶

Motorola Buys Net Device Technology in $11B Merger

High-bandwidth demand drives deal

BY MARY BETH D'AMICO AND DORTE TOFT

In a bid to get into the next-generation Internet device market, Motorola Inc. agreed to purchase TV set-top box maker General Instrument Corp. in a stock deal worth approximately $11 billion.

If the deal is approved, the General Instrument unit based in Horsham, Pa., will focus on giving consumers, both at home and traveling in autos, broadband access to interactive digital TV, Internet and voice.

Christopher B. Galvin, chairman and CEO of Motorola in Schaumburg, Ill., said surging demand for high-bandwidth services, especially overseas, was a driver for the deal. People want access to Internet, video and voice tailored to their needs, and ease-of-access is key, he said.

Frank Gens, an analyst at International Data Corp., said in an interview before the deal was official that Motorola's interest in a merger would center on General Instruments' providing technology for next-generation Internet access devices. ▶

D'Amico and Toft write for the IDG News Service in Munich, Germany. Terho Uimonen in Paris contributed to this report.

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MARK HALL

No stump speech

FIFTEEN YEARS AGO, I gave the after-dinner speech in a Washington hotel to a roomful of THUGs. No, it wasn't a Democratic fund-raiser or a Watergate reunion, it was the Tymnet Happy Users Group. (Back in those days, organizations liked to spruce up their names with adjectives.) Sadly, what I had to tell my audience was that their days were numbered — unless they got their data centers ready for the PC.

I got brief, polite applause and a brusque "see ya later" at the door. These THUGs wanted nothing to do with future technology in 1984 because they made their money on the time-sharing past.

It's a pity there's no analogous group for service provider customers, heirs to those gleeful time-sharing users. I'd like a chance on the podium again in front of people who represent the diversity of Internet-based outsourcing, from Net access to ERP operations. Today I'd be optimistic about the flexibility of service provider networks, their security, their ubiquity and their reliability.

My new talk would point to major investments, such as USinternetworking Inc.'s new data center in Milpitas, Calif. Because I'm a local boy, I'd also cite the presence in Silicon Valley of Abovenet Communications Inc. and Exodus Communications Inc., two of the nation's fastest-growing Internet service providers. I wouldn't be able to resist citing International Data Corp.'s estimates that the service provider market would jump from $10 billion last year to $37 billion in 2003.

As I warmed up to my subject I'd take a close look at, say, USi, and speculate about the advantages and the downside of outsourcing mission-critical IT applications. I'd suggest that my listeners get together and define usable criteria to share on which applications are ideal for outsourcing and which should remain inside. I'd recommend conference sessions where users described their experiences with application service providers.

My conclusion would be simple: Service providers aren't making their money on future technology, but on a part of the future way of doing business. And that's far more important. It's a real shame no organization, happy or otherwise, is around to hear my talk. It's a real crowd-pleaser. ❱

MARK HALL is *Computerworld*'s West Coast bureau chief. You can contact him at mark_hall@computerworld.com.

DAN GILLMOR

Thin clients: Can they stand up to tough questions?

IS THE THIN CLIENT really returning to center stage? You might guess, with the recent introductions of stripped-down terminals from Sun Microsystems and IBM, that it's another stab at a market customers largely rejected several years ago.

Some aspects are the same. Hardware prices still rival those of low-end PCs. And the vendors still promise lower total cost of ownership along with simpler and more reliable network management.

But Sun has made interesting changes in its new client, the Sun Ray 1, leaving it even thinner than before ["Sun's Third Client Try May Be Charm," News, Sept. 13]. This one basically paints the screen and leaves virtually all the processing chores to the server. And Sun has better integrated its thin client into the existing infrastructure, a very sensible move.

DAN GILLMOR is technology columnist at the *San Jose Mercury News.* Contact him at dgillmor@sjmercury.com.

Network computing makes a great deal of sense. It always did. But although many IT people would undoubtedly love to replace desktop PCs with easier-to-administer and more reliable devices, they should ask some of the same questions they asked back when Sun was promoting its JavaStation as IT's salvation. For instance:

Will the network stay up? This is more crucial than ever in the emerging era of interrelated intranets and extranets. The MCI WorldCom data outage a month ago was a wake-up call to people who had failed to back up their networks as assiduously as they back up their data.

Is it secure? More than ever, safety is a nonoptional feature. Recent news reports have described one security hole after another in a variety of products, and not just Microsoft's. IT and users need to remember that it isn't just the FBI that wants access to everyone's data. So do criminals. Sadly, as long as law enforcement makes it difficult for vendors to make encryption ubiquitous and embedded — largely by preventing export of products containing strong encryption, which adds to development and distribution costs — network security will be almost an oxymoron.

What about bandwidth? This is related to the first question, and on some levels it's more of an issue

"KIDS, WE DON'T KNOW WHICH IS MORE UPSETTING - THE FACT THAT YOU TRIED TO AUCTION OFF YOUR FATHER AND ME ONLINE OR HOW LITTLE YOU GOT."

NEWS OPINION

for home users than people in well-equipped offices. Or is it? Telecommuting is growing as the tools of communications and collaboration finally get good enough to create truly virtual offices. If the bandwidth to employees' homes keeps looking like a soda straw compared with the fire hose into the enterprise, IT's job stays more complicated than IT would like. And as streaming technologies load down the available bandwidth everywhere, quality-of-service issues — still unresolved — will become more urgent.

Does adding complexity to the center always make the end points simpler? Generally, yes, but maybe not always. Sure, green screens and ASCII are no problem. It's bound to be tougher when we're adding smarter devices to networks. When server software interacts with the software and hardware in cell phones, Palm handhelds and other devices, don't discount the potential for at least some unexpected problems. ▶

DAVID MOSCHELLA

Is Microsoft returning to its software roots?

A S SOCRATES KNEW some 2,400 years ago, the two most powerful words in philosophy are *know thyself.* Now that Bill Gates is less immersed in day-to-day Microsoft affairs, perhaps he's had time to revisit the classics. His company seems to be regaining its sense of self, after its often public identity crises over the past year or so.

Given Microsoft's awesome market position, the phrase *identity crisis* might seem a bit of a stretch. But show me a better way to describe Microsoft's insistence that it is not a media company, even while it labels AOL, which is a media company, as its chief competitor. How else would you describe the ongoing confusion over what Microsoft's Internet strategy really is, let alone whether it will fight or

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support a shift toward application service providers? Microsoft has done a good job of recognizing that it is no longer just about micros, but sometimes it has acted like it's not about software either.

All this comes to mind with the appointment of Richard Belluzzo to head-up Microsoft's Web-based activities. In today's IT industry, leadership appointments have taken on deep symbolic sig-

nificance. Appointing outsiders — IBM's Lou Gerstner, Novell's Eric Schmidt, Hewlett-Packard's Carly Fiorina, EDS's Richard Brown and Unisys' Lawrence Weinbach — typically signals a real commitment to change. Indeed, it's now taken as axiomatic that IT companies can't reinvent themselves quickly enough from within their own culture.

If this pattern holds true with Belluzzo, Microsoft's Web strategy should start to shift significantly. Given his long career at HP (mostly building up HP's printer business) and his brief and only partially successful stewardship of troubled Silicon Graphics, Belluzzo is anything but a media/content type of guy. He's not the sort of person to get distracted by selling cars, travel or finance online. He's much more naturally inclined to focus on technology, and this is precisely where Microsoft seems to be headed.

The story of Lucent explains why. Before Lucent was spun off, AT&T's equipment sales to other telecom carriers were severely handicapped, as potential customers instinctively resisted the idea of doing business with a major competitor. However, once Lucent was completely on its own, its business prospects and market capitalization soared, elevating Carly Fiorina with

it. Business is tough enough without competing with your customers.

Microsoft faces a similar situation. If it chooses to primarily promote its own entertainment, commerce and Internet service provider initiatives, companies such as AOL, Yahoo, Earthlink and others will be reluctant to become dependent upon Microsoft software — be it Windows NT, instant messaging, search engines or whatever. Steve Ballmer in particular seems to have realized that Microsoft might be better off reducing its emphasis on its dot.com activities and putting more resources into strategic software technologies. It's a timely recognition.

After almost a decade of denial, IBM had to eventually accept the fact that it could no longer dominate the market for international business machines but could thrive as a provider of global business services. Now it appears that Microsoft will also rein in its once seemingly unbounded ambitions, recommitting itself to being primarily a software tools company that helps others provide the specific services that customers really want. If Rick Belluzzo helps steer Microsoft toward this admittedly more humble course, it will mark both a return to Microsoft's roots and a simpler business environment for all. ▶

READERS' LETTERS

'Digital delivery' not ready for courtroom

D OMINIQUE Deckmyn's article ["Secure E-Mail Delivery Poised to Take Off," Business, Aug. 23] just scratched the surface of the issues surrounding electronic document delivery as a replacement for paper mail.

Though the Tumbleweed and PostX systems do provide mechanisms to demonstrate that documents have been delivered through the use of return receipts or equivalent mechanisms, alone they do not provide mechanisms that can be used to demonstrate in a court of law that the document being sent through one of these systems existed at a certain point in time and that the same document has not been modified since being processed by the document delivery system.

No court will be receptive to "digital deliv-

ery" until document delivery systems provide these mechanisms. In other words, no court will be receptive to "digital delivery" until timestamping becomes an integral feature of these vendors' offerings.
Michael Boberski
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Y2K Down Under

I WAS BROWSING the IDG site (www.year2000world.com) and was struck by the familiar sight of the date at the head of each story.

OK, I'm from Australia, so the U.S. date format (mm/dd/yy) is always amusing and aggravating to me, just as, no doubt, the dd/mm/yy format is to you. But what really struck me is that no one is bothering to do anything about it, despite the thinking world floundering in all the hype of the year 2000 problems.

Why don't we just do it? Use the yyyy-mm-dd format, I mean. It's not all that hard. First I do it, and then you do it, and then my mate does it and then yours. Before we know it, we will all be doing it, and the century (or whatever) of confusion will be a thing of the past.

Come on in, join the party. Make a stand. Do your bit for common sense.

Say: Year-Month-Day.
Ken Hall-Patch
Corporate business systems analyst
Australian Submarine Corp.
Adelaide, Australia
kphallpa@subcorp.com.au

Web graphics can be misleading

I WAS BROWSING your Web site looking at the "Playing the Pay Game" articles. As I came to the end of the articles, I came upon a Windows-looking graphic that scared me into believing that my hard disk

needed some remediation activity performed. I am a technologist, so I was able to recognize that it may be an advertisement. If I were not savvy, however, I could have sought help for a problem I did not really have.

Please note your own warnings ["10 Corporate Rules of Conduct," Rule No. 3] as they apply to the graphic. I realize you are trying to be careful of confusing editorial and advertising. I think this care also is applicable to the inadvertent scare some advertising can cause the reader.
Marvin Hagmann
Tulsa, Okla.

COMPUTERWORLD welcomes comments from its readers. Letters shouldn't exceed 200 words and should be addressed to Allan E. Alter, columns editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 875-8931; Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

JEANNE W. ROSS

Clueless execs still keep ERP from delivering value

A CEO ONCE TOLD ME that IT is like dental work: "I know it's good for me, but it's painful." When it comes to ERP systems, we're well aware of the pain, but we often question whether the systems are good for anything.

Simply stated, an enterprise resource planning system is nothing but a set of integrated transaction processing systems. For firms whose legacy systems obstruct access to information, an ERP system has the potential to put relevant data in the hands of decision-makers. Decisions can then be made by the right people at the right time based on appropriate facts.

It is unlikely, however, that many ERP implementations will deliver on this promise. That's not because the concept of ERP systems is flawed. Nor is it because of limitations with existing software packages. The reason ERP systems will fail to generate significant benefits is because executives who sponsor ERP initiatives often have no idea what they're getting into.

JEANNE W. ROSS is principal research scientist at MIT's Center for Information Systems Research. Contact her at jross@mit.edu.

Misperceptions about ERP systems come in three forms. In some cases, management believes that the firm is merely investing in a new technical infrastructure. This view fails to recognize that the ERP system provides the foundation for a very different kind of business. Executives will concern themselves with where to park the car when they've bought themselves a spaceship. Ultimately, a firm that implements an ERP system to replace a broken infrastructure is likely to find it still has a dysfunctional IT infrastructure.

The second misperception is that an ERP system will impose discipline and process integration on an organization. ERP, in fact, provides an ineffective infrastructure *unless* an organization is disciplined and cross-functional in its processes. Just as a new piano doesn't come with a guarantee that it will produce beautiful music, an ERP system doesn't deliver "best practice."

Finally, there is a widely held perception that ERP should yield improvements in baseline operating measures. On the contrary, ERP systems will have their biggest impact on processes that were never before measured — things that fell between the cracks and had negative impacts on quality or cycle time. The battle cry for measurable outcomes that demonstrate a positive return on the ERP investment has focused attention on more easily measured but less valuable outcomes.

These misperceptions lead senior managers to underestimate their role in driving the benefits that ERP can support. Particularly dangerous are visionaries who believe that ERP systems can lead to fundamental organizational change but have no strategy for ensuring organizational learning to bring about that change. ERP becomes valuable when employees at all levels of the organization take advantage of increased data visibility to make decisions that enhance the firm's competitiveness. As they clamor for the data they need to be effective, they learn how to leverage ERP's capabilities. Management's role becomes one of creating a highly empowered environment and focusing everyone's attention on key initiatives.

It doesn't appear that managers at many firms have embraced this role or know how to perform it. Consequently, most firms that embark on the ERP journey will feel only the pain. They won't emerge with a shiny new smile. ▶

MICHAEL CUSUMANO

Why Iridium fell to earth: lessons from a debacle

I RIDIUM HAS BEEN on my mind since a reporter called the other day and asked, "How can smart people make such bad decisions? How often does a debacle like Iridium happen?"

Good questions. Iridium is the recently bankrupted joint venture that was initiated by Motorola in the late 1980s to build a network of 66 high-orbit satellites to provide wireless telephone service anywhere on the globe, including developing countries and hard-to-reach areas. Iridium has invested some $5 billion to date.

MICHAEL CUSUMANO, co-author of *Competing on Internet Time: Lessons from Netscape and Its Battle with Microsoft,* is a professor at MIT's Sloan School of Management. Contact him at cusumano@mit.edu.

Some answers: First, we know that innovations can take decades to commercialize and that there can be many winners and losers along the way. The more time involved, the greater the uncertainty, because much can happen between the laboratory and the mass market. Even if the technology works, lots of alternatives can appear, or customer needs might change radically. The lesson here: Reducing time to market can reduce future uncertainty, especially with a rapidly evolving technology and marketplace.

Second, we know some innovations require massive investments in infrastructure before they become viable. The more infrastructure required, the greater the uncertainty of success, especially if the assets are good only for the original idea. The lesson here: Reducing infrastructure requirements, spreading investment risk and increasing asset flexibility (like relying more on software than on hardware) can reduce the likelihood of a strategic and financial disaster.

Third, we know substitute products eventually threaten most businesses. Sometimes they come from different industries and are hard to spot in advance. The Pony Express was a great idea, but the railroad and telegraph made it obsolete within about a year, even though those alternatives required daunting infrastructure expenditures. The automobile put horse-and-buggy outfits out of business, even though it took many years to improve auto designs and invest in factories, roads, petroleum refineries and gas stations. The lesson here: Think broadly about potential substitutes. If lots of possible alternatives emerge, then the investment is probably bad.

Even "experts" find it difficult to make the right calls. Consultants at Arthur D. Little predicted there would be demand for only about a half-dozen computers worldwide after World War II. They failed to foresee innovations in circuit technology (which led to incredible improvements in cost, price and reliability) such as the transistor, which was already in AT&T's Bell Labs. Other consultants dismissed Xerox's copying machine in the 1950s because the new device was so expensive. They didn't foresee cheap leasing, per-copy charges and the addictive nature of copying. RCA wasted hundreds of millions of dollars in the 1960s and 1970s on its ill-fated video disc, which lost out to the VCR.

More recently, Microsoft spent a billion dollars on the original Microsoft Network — a propriety non-Internet system designed to compete with AOL. Bill Gates deftly changed course when he realized his mistake, but we shall see if the Teledesic satellite investment pans out. Teledesic is a high-orbit network of sophisticated satellites intended to bring the Internet over wireless devices. This system has also taken years to develop and faces stiff competition and simpler alternatives.
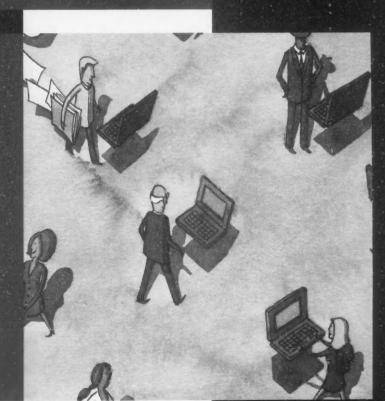
Returning to Iridium: Even when it began, it had all the features of a potential failure. The Motorola people knew they needed 10 years or more to deploy the system. They knew it required a huge, risky investment in R&D and infrastructure. Motorola found partners, but planning, designing, financing, building, deploying and debugging the system have taken more time and money than expected. In addition, the service today is expensive and inferior to cheaper alternatives, like new land-based cellular phones and Internet communications. Iridium doesn't even work indoors or offer data services yet.

Not surprisingly, Iridium has only 20,000 customers, instead of the 600,000 "planned" for 1999. Producing a new generation of satellites is rocket science — usually the task of governments, not corporations. Bankruptcy was not inevitable, but it is not surprising. ▶

White
Paper

SEPTEMBER 20, 1999

mobileinsights

Mobile Computing:
Total Benefit of Ownership

COMPUTERWORLD

MOBILE IN THE MILLENNIUM: TOTAL BENEFIT OF OWNERSHIP

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Industry Analyst and
Editorial Director

The world has changed dramatically in the past 10 years. We now live in a global economy, where business decisions are made at the speed of light. The Internet has grown from a little-known government tool to an entity that average citizens can use to do their shopping and keep in touch with friends and family around the world.

The Internet has also changed the daily work habits of enterprise employees. Workers are using the Net to tap in to their corporate databases, which allows them to be more responsive and productive while on the road. Enterprise workers are also putting in more hours than ever before, but not necessarily at the office. As a result, the tools they use to get their jobs done have changed to keep pace with the changing workday.

In this special supplement for *Computerworld*, we explore the costs of deploying mobile systems as well as the benefits. This report was designed to help IT professionals properly consider both costs and benefits when evaluating the acquisition and deployment of mobile systems with an emphasis on portable PCs.

Mobile computing is usually synonymous with notebook PCs, and for the purposes of this article the term "mobile" will be used to refer to these largest of the mobile devices. Over the past few years, notebook PCs have been placed in four categories, ranging from all-in-one, high-end designs to ultraslim and light portables with all their media bays included in a "slice" that can be attached and detached (see Table 1, page 6). Mobile computing encompasses more than just notebooks, however. It has evolved over the past few years to include "mobile information appliances," or MIAs. These include a variety of handheld devices, from PC Companions (popularly known as Jupiter devices) and palm-size PCs running Windows CE, to personal digital assistants (PDA) running Windows CE, the Palm operating system or a proprietary operating system such as Psion Inc.'s EPOC. Mobile computing now also encompasses smart phones and two-way paging devices, which can synchronize with users' desktop PCs (see Table 2, page 10).

Mobile Insights is an analyst and consulting firm based in Mountain View, Calif., that focuses on the mobile computing and data communications market. The company publishes a free online newsletter, *Mobile Letter*, as well the MobileTrax Online subscription-based research service, and also produces several mobile computing conferences throughout the world yearly. For more information, go to *www.mobileinsights.com*.

Portable as Primary

Portable computing has become the primary platform for professional office workers in the enterprise, that is, workers use a portable device as their main computer. That isn't surprising when you consider the latest Pentium II notebook PCs have higher performance than 80% of the installed base of desktop PCs. In addition, the portable has become the primary computer for approximately 60% of mobile workers and that number is expected to rise to over 80% in the next few years. Several high-profile companies, including Intel Corp., have announced that they plan to convert to an 80% notebook installation in the next 12 to 18 months. Intel liberally defines the mobile worker as "anyone who goes home" (Frank Spindler in keynote address at Mobile Insights '99 conference, March 1999). So, in Intel's case, the mobile worker may be a knowledge worker and not a typical "road warrior." We're finding that more and more companies are doing the same, realizing that the average office worker can benefit from the mobility and flexibility that portable computing offers.

Other large companies making the move to "portable as primary" include technology service provider Inacom, pharmaceutical giant SmithKline-Beecham, the Chubb group of insurance companies, public utilities firm Texas Utilities, Big Five accounting firm Deloitte & Touche, retailer WalMart and book publisher Simon & Schuster. And it isn't just the huge corporations that are going mobile. Smaller companies, such as mobile communications firm Xircom (see Case Study, page 12), shoe manufacturer NineWest, music company Elektra and Hotel Le Meridien Beverly Hills (formerly Hotel Nikko), are going mobile in a very big way.
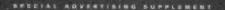
This trend toward the portable computer becoming the primary PC of most professional workers can be based on a number of key developments in the past decade (see Table 3, page 14). And there are more significant changes coming in the very near future that will help accelerate the adoption of portables. Changes include the expected introduction of Intel's "Geyserville" dual-mode technology, which will allow notebooks to perform like their desktop counterparts when plugged in and like notebooks when on battery power. Bluetooth-enabled devices are also expected to hit the market in the next six to 12 months, allowing wireless synchronization through radio frequency — without the line-of-sight requirement of infrared — among a variety of desktop and mobile devices.

Costs of Supporting a Mobile Workforce

Most professional workers are away from the office at least 20% of the time — either traveling within the enterprise campus, in the local region or around the world. These workers don't have easy access to the enterprise's network resources if they are tied to the network via a desktop in the office. Hence, we've seen rapid progress in the development of portable computers — systems that have the performance equivalent to most desktop PCs but that can be easily carried from one office to another and from the office to the airplane to the hotel room and to a client site.

There is no doubt that mobile computing is here to stay. But acceptance hasn't been an easy road. Cost is the No.1

reason. What's driving this? Miniaturization of components (for example, smaller devices are more expensive, at least initially), different and more expensive technologies like color active-matrix TFT displays and more extensive training and support. Portable users require more training because they are often accessing their data remotely. If their system requires repair or maintenance, they must either do it themselves or know whom to call to fix the problem. Hence, remote access and repair can be most costly to an enterprise in terms of time and money. But products are coming to market to help make the inherent difficulties of remote access easier to handle. Typically, most IT organizations allocate an additional 50% of the costs of a desktop to provide a portable computer system with the same capabilities. Thus:

Cost (Portables) = 150% x Cost (Desktop).

So, if a desktop system costs $2,000, then the equivalent portable system will cost $3,000 (or more if higher-end features are desired). Initially, looking at this price differential, it appears that portable computers shouldn't be considered by an IT organization unless there is some justification for the increased cost. But the real question is whether the added benefits of owning a portable system, particularly the ability to work almost any place and any time, justify that increased cost. As you'll see, the benefits of using a portable in an enterprise far outweigh the cost.

One of the most hotly debated issues for enterprise IT is the "total cost of ownership" (TCO) metric. TCO prescribes how management should consider the total lifecycle cost of information technology: the hardware, training, mainte-nance, support, upgrades, service and other soft costs, such as supplies. Most market research organizations have discussed and debated TCO. Gartner Group Inc. has published many papers on the subject of calculating the TCO for acquiring and maintaining a PC in an enterprise. It isn't surprising that Gartner reports that the hardware cost is less than half the total cost of owning and maintaining PCs. Its extensive research on the topic of TCO has produced matrixes that calculate how quickly the costs of purchasing a notebook over a desktop can be recovered based on system price, a worker's yearly and hourly wage and how many more hours a worker puts in as a result of using a notebook PC. Gartner's research has shown that this cost recovery can range from a few weeks to several months.

There is no question that TCO is important to enterprise IT. But the cost is only part of the equation. While cost is key, it's also important to consider the technology's bene-fits. Those include productivity, flexibility in doing work, increased and more effective communication and better understanding among workgroups. Thus, most IT organi-zations have to consider the value provided by the tech-nology, not just the cost itself. As a result, TCO is now balanced with TBO — total benefit of ownership:

TCO = Total cost of owning IT, including hardware, software, maintenance, support and so on.

TBO = Total benefit of owning IT, including improved pro-ductivity.

Thus, when an analysis of IT costs are made, most for-ward-thinking organizations will now also attempt to define the benefits of IT.

Table 1: Notebook PC Market Segments

Product Segment	Definition	Popular Examples
Desktop replacement	3-spindle, high-end features, large display	Dell Inspiron 7000, IBM ThinkPad 390, Micron TransPort NX
Thin and light	2-spindle, swappable bays	Dell Latitude CPi, IBM ThinkPad 600
Ultraportable	1-spindle, often with "slice"	ThinkPad 570, Toshiba Portégé 7000
Ultralight	Small, 1-spindle	Sharp Actius, Sony VAIO 505

Market Segmentation of Portables

Ultraportable 15%

Ultralight 6%

Thin and light 53%

Desktop replacement 26%

Source: Mobile Insights, 1999

As more enterprises give workers a notebook PC to use as their primary PC, companies must adopt a new approach to managing these mobile assets to maximize the investments in mobile systems. The critical factor for implementing and effectively managing mobile assets will be refocusing management practices and philosophies to consider more than just the total cost of ownership. While TCO may keep the accounting department satisfied, mobile workers will be left stranded with inadequate services to stay productive while off-campus.

Thus, the extra cost of buying a portable over a desktop isn't the issue. The enterprise gets quick payback for the cost. The question isn't justifying the portable but managing the portable computer asset within the enterprise. What's needed is a definitive method to measure the increased benefit that results from using the portable computer and to determine how the enterprise should best manage its mobile computing assets.

A Total Benefit of Ownership (TBO) metric, which calculates improvement in productivity resulting from using a portable system in the enterprise, is needed. Mobile computing assets are critical to the operation of any business to enhance productivity and should be managed as such throughout their lifecycle in the context of total

benefit of ownership.

No one knows exactly how to measure the return on investment (ROI) of mobile computing in the enterprise. Traditional ROI and TCO methodologies for IT solutions generally lack the breadth to measure the variety of manageability issues associated with mobile assets. Only TBO can address the critical issue to measure the benefit of using mobile systems in the enterprise.

Total benefit of owning mobile assets is based on a calculation of the Benefit Dollars. Thus:

TBO = Total benefit expressed in dollars from owning notebook PCs.

Total Productivity = The portable's usefulness to the worker.

TCO = Total cost of purchase, training, upgrades and maintenance of the notebook PC.

If you can calculate the Benefit Dollars, then you can compare that to the Total Cost and have a good measure for determining whether the benefits outweigh the costs. If the TBO (Benefit Dollars) is greater than the TCO (Cost Dollars), then there is a clear benefit to owning a notebook PC. And, if the TCO is greater than the TBO, then buying a notebook PC isn't justified.

Understanding the total benefit of ownership (TBO) is critical to the success of mobile workers for two reasons:

■ The ultimate goal of deploying mobile solutions across an enterprise is enhancing productivity or, in other words, reducing the costs associated with increasing productivity. TCO is a key component to measuring the success of using mobile systems in the enterprise, but it's not adequate. Instead, a metric that focuses on the Total Benefit of Own-

ership (TBO) is the proper focus to evaluate mobile systems in the enterprise.

■ Portables are becoming the primary computer for workers beyond just the executive staff. That's how workers increase their personal productivity: When portables become the primary system, they enable workers to work at any time and in any place

Calculating TBO (Benefit Dollars)

The Total Benefit of Ownership (Benefit Dollars) can be calculated by estimating the financial impact of using a notebook PC in the enterprise. A good estimate can be made from the following formula:

Benefit Dollars = Productivity Dollars + Flexibility Dollars + Travel Dollars + Personal Empowerment Dollars, where . . .

Productivity Dollars = Work done outside of business hours x hourly rate of work.

Flexibility Dollars = Amount of time likely to be traded with in-office work x hourly rate of work.
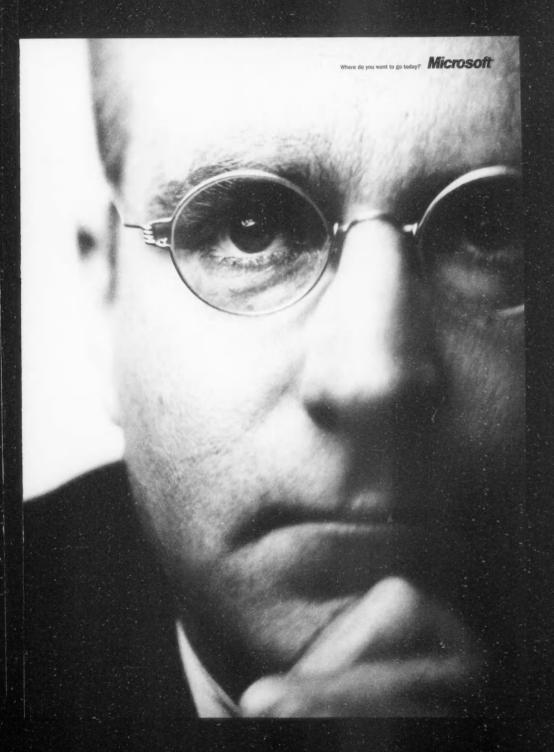
Travel Dollars = Amount of time spent working while traveling x hourly rate of work.
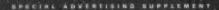
Personal Empowerment Dollars = Amount of time each week that is enhanced by having a notebook PC x hourly rate of work. The calculation of the number of hours comes from how each person rates the benefit of using a portable computer. Some people feel a portable is of no personal benefit (time = 0) whereas other people feel that they couldn't get along without a notebook PC for a single day (time = 10 hours). Personal Empowerment Time is limited to a maximum of 10 hours in a given week even if the person uses it 100% of the

"Two and a half years ago, we took one of the most mission-critical systems in the U.S. and put it on Windows NT. It was a bold decision at the time. But it's helped us lower our cost per transaction by two-thirds. In fact, I've had a number of my peers who had gone to UNIX say that they wished they had done what we did."

Steve Randich, CIO, Chicago Stock Exchange
on choosing Microsoft® Windows NT® Server 4.0 over UNIX ▶

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time. That variable is the only one that can't be measured directly, but it is significant nonetheless.

Let's look at two very different kinds of workers and see how the Benefit Dollars might be calculated:

John, a Staff Accountant

John mostly works a normal schedule but occasionally puts in overtime when deadlines must be met to close the company's books and generate a financial statement. He is married with three kids in school, and his wife works, too. He works an average of four hours a week at home on his portable computer. Those four hours give him the flexibility to support his children's activities during workhours. He doesn't travel out of town. By owning a notebook, he

Table 2: Mobile Information Appliances

Product Segment	Definition	OS Platform	Example
PDAs	Portrait-style display, pen input	Palm OS, Windows CE	3Com Palm, Philips Nino 500, HP Jornada 420, Casio E100
Palmtop	Clamshell design with keyboard	Windows CE	HP Jornada 680, Psion Series 5
H/PC Pro	Clamshell design, nearly full-size keyboard	Windows CE	IBM z50, Jornada 820
Data Viewers	Credit-card-size, some light text input	Proprietary	Casio Viewer, REX Pro
E-mail Organizers	Two-way pagers, for example	Proprietary	RIM Blackberry, Sharp Pocket Mail
Smart Phones	Cellular phone with enhanced capabilities	Palm OS, EPOC32	Ericsson R380, Nokia 9000I, Qualcomm pdQ

Source: Mobile Insights, 1999

Xircom

A Mobile Connectivity Organization that Walks the Talk

Patrick Piccininno, the recently appointed CIO of mobile connectivity firm Xircom in Thousand Oaks, Calif., has a good track record of bringing mobile technology into organizations.

Back in the early 1990s — the dinosaur age of notebook computing — he worked as an applications manager at ADC Telecommunications, a $2.3 billion firm that provides hardware infrastructure solutions. He was part of a team that recommended that the company make loans totaling almost $1 million to its employees so they could purchase PCs to use at home. Using a rough estimate that people would use these systems about 20% of the time for work-related activity — whether it was checking e-mail or logging on to internally managed systems — they were able to convince management that this was a good idea.

As a result, the amount of dial-in activity to the corporate office increased 35% over six months. Of the computers purchased, many were high-end desktops, but a good 30% of employees purchased notebook PCs. Says Piccininno, "What we are seeing in the market today had its roots years ago. Most organizations believe that the opportunity to allow people to work from home, to exploit mobil-

ity, not only benefits the employee, but also the company."

At Xircom, Piccininno oversees a 900-user population dispersed throughout the U.S., Europe and Asia. Not surprisingly, this mobile connectivity organization, which hawks products like the RealPort Integrated PC Card and a variety of PCMCIA modem and LAN cards, has seen the benefits of mobile computing over the past 10 years.

"As our hardware infrastructure was developed and enhanced, it was done with the single purpose of making sure we could support mobile computing," Piccininno says. "Our products are geared toward this market, and we want to practice what we preach. Companies have to adapt to this business model or they're going to be passed by their competition."

Xircom's current ratio of notebooks to desktops is a healthy 70-to-30. "We rarely buy desktops anymore. Most new purchases are laptops," Piccininno says. And it's not just road warriors; the administrative assistants use notebooks, too. The company line is that although employees may not be traveling, there's still an opportunity on weekends or evenings to check e-mail or the Internet site to stay ahead of the workload or see what's on tap for the next day.

Says Piccininno, "Most employees would agree that the connectivity piece and the mobile piece give them that flexibility."

Xircom encourages employees to try a broad range of vendor machines in order to gain user experience on a cross section of platforms that can also be incorporated into their product design. Many users are on IBM ThinkPads, but systems from all the major PC vendors have also been purchased.

Xircom is considering a move to a more consistent standard and is looking at Dell and the direct model. Says Piccininno, "As many organizations have discovered, there are some specific cost advantages to that. We're also looking at exploring a lease vs. buy decision relative to our hardware platforms, something that is becoming more attractive nowadays, especially as many companies start to reduce the duration of time that they're depreciating these assets."

Cost of ownership hasn't been formally considered at Xircom. It's been more of a "leap of faith" to go heavily mobile, Piccininno says. "Our products are geared toward everything mobile, and so as we implement a discipline around how we are going to utilize mobile technologies, it's a given that we have a mobile-centric business model

around our technology."

Regarding TCO, Piccininno says: "I think we all know that it's more expensive to support mobile computers. From a leasing perspective, we're looking at the benefits from a cost model standpoint and the opportunity to turn the systems over more readily to give the mobile workforce as much new power, features and functions as possible. [Also, to not have] the IS organization worry about disposing of obsolete equipment."

An increasing part of Xircom's decision to go with a specific vendor is its service and support offering. A vendor must have global software and technical support as well as replacement equipment for road warriors on a 24/7 basis.

Piccininno agrees that while notebooks may require an extra 50% in initial cost, the 35% increase in productivity he's seen at Xircom makes the payback period "negligible" compared with desktops. "We really believe that any upfront costs that we invest that are perceived to be a higher out-of-pocket costs are very quickly made up," he says.

While high on notebook PCs, Piccininno believes that there is still room for improvement with the technology. Desktops are still more stable and reliable because they don't get moved around, but notebook users "drop them, break them, use them as hammers, run them through their dishwashers," he laments. "It's difficult to keep them up and running. So, we're going to be looking at hardware vendors who have a proven track record of producing high-quality products that will eliminate the downtime and hopefully some of the frustration that we feel in trying to support a mobile workforce."

As a road warrior, Piccininno also struggles with connectivity from a wide-area network perspective. "If you're an international organization, how do you get access at a hotel, how do you dial in, how are the [virtual private networks] starting to be enhanced and developed? Is there a virtual way to get legacy e-mail via the Internet so that you don't have to dial in directly to a private network?" He believes that wireless will play a more important role in the future. "We're going to see a more defined wireless solution, from Xircom specifically, and from the industry as a whole."

Port replicators are another source of frustration at Xircom. "We'd be excited to see a more standard method to connect laptops to other peripherals so that if we change from IBM to Dell to Compaq to Toshiba we don't have to throw out a $300 or $400 port replicator," Piccininno says. "We realize that if we are experiencing these issues in our mobile user population, then our customers are, too, so you can bet we are addressing these questions."

Xircom may not represent the typical IT organization. It's a high-tech company with a Silicon Valley entrepreneurial attitude — even though it's further south in the Los Angeles area. But Xircom does typify the young, growing company that realizes it has to stay ahead of the technology curve to maintain its market leader position. And arming its workers with notebooks — from administrative assistants to globetrotting execs — has always been on the agenda.

Says Piccininno, "In my career, I can say I have never met resistance to giving people a mobile computer. Most believe it to be an absolute necessity. They can bring it home, they can work, they can log on to the Xircom WAN and have access to everything they do at work, including Internet browsing. If they didn't have a mobile computer they would feel that you've done nothing less than cut off a couple of limbs. They just wouldn't be able to survive without it." ▶

Table 3:

Major Developments in
Portable Computing Technology

1989	Compaq introduces first notebook PC.
1993	Color displays replace monochrome displays.
1995	Intel Pentium processors replace 486.
1996	The Internet becomes an important business tool.
1997	IBM introduces a 5G-byte disk drive for portables.
1998	14.1–in. color displays set up true desktop replacements.
1998	Intel introduces Pentium II CPU in portables.

Source: Mobile Insights, 1999
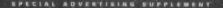
Expected Accelerators to
Portable Computing Adoption

2000	Delivery of Intel's "Geyserville" dual-mode processor.
2000	Bluetooth-enabled devices come to market.
2000	More USB peripherals come to market.
2000	Universal docking strategies come to market.
2000	25G bytes common in a notebook PC.
2001	Bluetooth becomes standard in handhelds and notebooks; demonstrations of broadband wireless; Ethernet built-in for most notebooks.
2002	Broadband (>350K bit/sec.) becomes widely available.
2002	DVD-RW enters the market.

believes he gains about three hours a week of personal empowerment. He makes $48,000 per year, or approximately $24 an hour. John's annual TBO (Benefit Dollars) is calculated as follows:

$TBO = (4 + 4 + 0 + 3)$ *hours x 52 weeks x $24/hour =* $11,232.

Thus, the benefit of John owning a notebook PC is calculated at $11,232. If he has a $2,500 notebook that has an annual cost of another $2,500, then the TCO is $5,000

compared with the benefit of $11,232, which far outweighs the cost. That results in a TBO/TCO ratio of 2.23.

Mary, a Product Marketing Manager

Mary works about 50 hours a week. She spends about eight hours a week working on her portable computer outside the office. She's married, with one child. She needs to have about two hours a week away from the office to support her one child. She travels about once a month for two days and averages about four hours a month of work while traveling. She feels that owning a portable computer is worth six hours a week in personal empowerment. She makes $60,000 a year, or approximately $30 per hour. Her TBO Benefit Dollars is calculated at:

$$TBO = (8 + 2 + 4 + 6) \text{ hours } x \text{ } 52 \text{ } x \text{ } \$30/hr = \$31,200.$$

Thus, the benefit from Sally owning a notebook PC is calculated at $31,200. If she has a $4,000 notebook that has a total annual cost of another $4,000, then the TCO is $8,000 compared with the benefit of $31,200, which far outweighs the cost. The TBO/TCO ratio is 3.90.

In both these examples, a notebook PC is shown to be far more efficient, far more flexible, far more empowering and far more beneficial to the worker and the enterprise.

At this point in time, the benefit of deploying notebook PCs in the enterprise is so substantial that it should be considered by every enterprise, both big and small.

Final Comments

The message is clear for IT management. You used to look at portable PCs as something you acquired for all those people who work outside the office all the time. Now, portable PCs are being considered for all professional workers because their benefits greatly outweigh desktops. They provide flexibility and a human resource benefit that matches improvements in productivity.

Should you throw out all your desktops? Maybe not, but you should consider moving workers to portables when they're due for a new PC. The world is going mobile. It's likely that your best strategy is to study the benefits of portable PCs for employees in your organization. And, when you do, you can provide a migration strategy that will make sense both financially and technologically. Once you've converted to portable PCs, you'll begin doing the same for handhelds.

Eventually, most workers will have a handheld as well as a portable PC. While handhelds today are primarily productivity aids that assist in keeping track of appointments and contacts, it won't be long before they will have access to important enterprise data, first via batch synchronization and, eventually, via near-real-time wireless data.
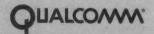
Total Benefit of Ownership (TBO) is the new buzzword in IT. It's important that you, as the IT professional in your organization, understand where and when mobile computers and their software and services can best help the workers in your organization. Portables aren't just for mobile workers anymore. They're for almost all workers. Put your ear to the tracks. You can hear the mobile computing freight train coming. It's time to make the transition work for you. If you don't, the train will probably roll right over you. If you do, you will likely gain a competitive advantage in the market. ▶

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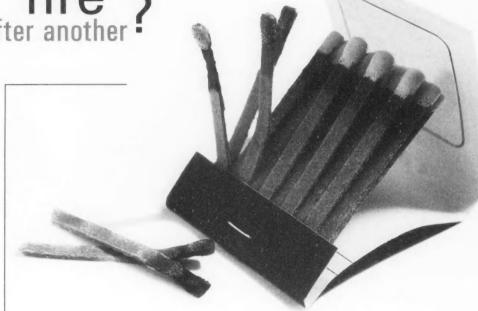
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Or at least it will more easily, under a new Extensible Markup Language-based specification that's being developed by the American Institute of Certified Public Accountants and Big Five accounting firms. It should make it easier to share financial information from incompatible spreadsheets across disparate operating systems. ▶ **36**

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You've thought long and hard about the impact of the millennium on your systems. But have you prepared for the impact Y2K will have on your staff? Ed Yourdon raises some issues you'll need to address up front. ▶ **39**

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Sherita Ceasar, newly inducted into the Women in Technology International Hall of Fame, talks candidly about the glass ceiling, men's management styles, why women need mentors and what it takes for women to excel in IT. ▶ **67**

HAVING FUN YET?

Companies are pouring time and resources into retention programs aimed at making their

corporate environments more fun and desirable. But how can a manager tell when these programs are really making employees happy? ▶ **70**

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Flow manufacturing allows companies to produce products only when an order is actually received, cutting down on inventory costs and defects. The idea isn't new, but new software for it is creating wider interest. ▶ **73**

CAREER ADVISER

Columnist Fran Quittel offers advice on career opportunities in e-commerce, Web marketing and getting an overseas assignment. ▶ **74**
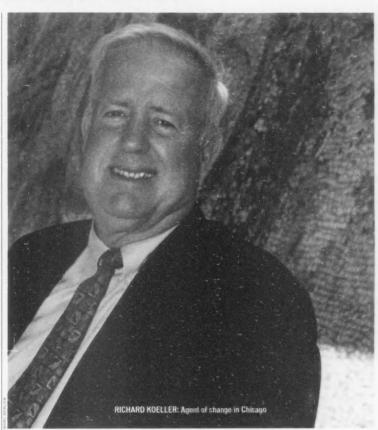
WITI ON THE WEB

Women In Technology International will hold its East Coast conference in Boston next week and unveil its new online community site. Kathleen Melymuka offers her observations on past gatherings and what to expect on the Web. ▶ **68**

E-POLITENESS

Colorado company Netsage is developing applications that help e-commerce sites be friendlier, offer encouragement and advice, and recognize a customer on a return visit — sort of like a nice person with good social skills. ▶ **34**

RICHARD KOELLER: Agent of change in Chicago

MARC BERLOW

A DAY IN THE LIFE OF A CIO

MEET RICHARD KOELLER. He's the top IT officer for the Chicago Public Schools, the nation's third-largest public school system. His mission: Create an IT infrastructure that provides state-of-the-art support for all staff and students in nearly 600 schools, educate the educators on IT and add computers to improve computer literacy. We followed Koeller for a day and found how tough it can be to push his agenda.

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'Polite' Sites May Do More Business, Research Says

BY JULIA KING

Who actually believes that computerized voice that tells you over and over how important your call is as you're left to cool your heels on hold for what seems like an eternity?

Computerized error messages on the Web have a similar problem. They're supposedly designed to help but often leave users who are already baffled feeling blamed and more frustrated.

So users reach for the telephone to speak to a real, live human being — at a cost that is more than three times that of automated help.

Netsage Corp. in Golden, Colo., is looking to change that by boosting technology's so-called social intelligence. The idea is to imbue computer systems, notably e-commerce sites, with the traits and behaviors that human beings respond to positively.

"Research shows that people respond to politeness and reciprocity, so if a Web site wants information from users, it should do something for users first," said Clifford Nass, vice president of interface research at Netsage and a psychology professor at Stanford University in Stanford, Calif.

Sites With Charm

Web-based applications and shopping sites should also be friendly, offer users encouragement and recognize customers on subsequent visits. In short, they should aim to function like a nice person with good social skills.

According to a recent Harvard University study, socially intelligent interfaces almost double the likelihood that a shopper will make a purchase.

Interactive Lending Inc., a mortgage services outsourcing company in Oklahoma City, hired Netsage to help develop such a personality for a Web-based virtual assistant that helps customers complete long and complicated loan applications online. What Netsage

came up with is "a female who is very friendly and very bubbly and encouraging and efficient," said Interactive Lending President Mark Meyer.

"She will call the borrower by name once they've logged in, and if they have to leave and come back, she'll recognize them and take them right to where they left off," Meyer said.
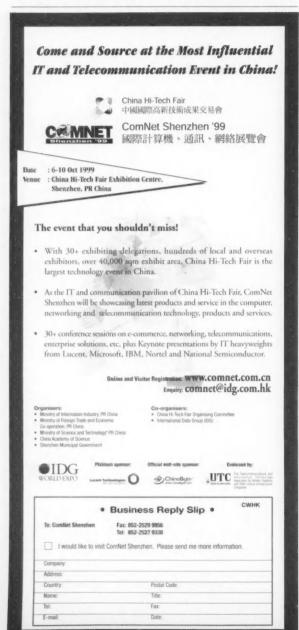
The virtual assistant also pops up from time to time with useful tips. She may remind a customer who is asked to fill in his income that he should fill in the amount that he earns each month before taxes.

The virtual assistant is also encouraging. If a customer identifies himself as having a low tolerance for risk, then chooses a fixed-rate mortgage, the assistant might say "That's a good choice" and respond differently on other choices the customer makes.

Netsage employs a software-based artificial intelligence engine, which Netsage calls the social intelligence server, to track user choices and respond appropriately. The server automatically collects information and learns from the results of each interaction with an individual user.

Allen Bonde, an analyst at Boston-based Extraprise Group Inc., categorizes Netsage as a developer of "next-generation personalization" technology that aims to increase technology usage by bringing "high-touch" people skills, such as recognizing and responding to nuances in a user's behavior, to the Internet. Until now, Web-based personalization technology has been more content-driven and self-service-oriented.

"The idea is that you can get people to feel better about dealing with technology if you think about how they deal with people," Bonde said. ▶

> [Netsage came up with] a female who is very friendly and very bubbly and encouraging and efficient.
>
> **MARK MEYER, PRESIDENT, INTERACTIVE LENDING**

SNAPSHOT
World Wide Wait

The average time, in seconds, to download a home page from one of 40 business-related Web sites during business hours for the week of Sept. 6:

TOP 5 BEST-PERFORMING WEB SITES	
Yahoo	1.45
Infoseek	2.56
Netscape	2.58
Apple	2.60
Compaq	2.83

BEST AREAS TO WEB SURF	
St. Louis	2.88
Pittsburgh	2.88
Boston	2.92

WORST AREAS TO WEB SURF	
Philadelphia	5.89
San Diego	5.68
Tampa	5.06

SOURCE: KEYNOTE SYSTEMS INC. WWW.KEYNOTE.COM, SAN MATEO, CALIF.

Some Companies Still Dodging SEC's Y2K Disclosure Rule

BY KATHLEEN OHLSON

Despite efforts by the Securities and Exchange Commission (SEC), many Fortune 1,000 companies have failed to disclose the cost of their year 2000 fixes, according to a study by Palm Beach Gardens, Fla.-based Weiss Ratings Inc., a firm that offers Y2K readiness ratings on U.S. corporations.

SEC guidelines require public companies to disclose their total estimated year 2000 budgets and current Y2K spending, Weiss said. But many companies are reporting only partial information or none at all.

For example, IBM said its estimated Y2K budget is $575 million, and Hewlett-Packard Co. reported $250 million, but neither company provided information on actual expenses, Weiss said.

Weiss also said Bristol-Myers Squibb Co. in New York, Dell Computer Corp. in Round Rock, Texas, Enron Corp. in Houston, Merck & Co. in Whitehouse Station, N.J., Microsoft Corp. and Sysco Corp. in Houston didn't provide actual Y2K costs and budget estimates.

In addition, they failed to disclose this information in their mandatory 10K or 10Q SEC filings in 1998 and 1999, Weiss said.

Weiss also said it hasn't obtained complete year 2000 costs from public documents for 41 of the Fortune 500 companies.

Points of Contention

Most of the Fortune 1,000 companies, regardless of whether they made full disclosure, include standard language in their financial statements that says Y2K costs are "not material," Weiss said.

But according to an SEC statement on disclosures, Y2K issues are "likely to be material."

Some of the companies that failed to completely disclose their year 2000 budgets and costs include San Jose-based Cisco Systems Inc., Islandia, N.Y.-based Computer Associates International Inc., Austin, Texas-based Hormel Foods Corp. and Mountain View, Calif.-based Silicon Graphics Inc.

SGI spokeswoman Noreen Lovoi said the company doesn't track year 2000 expenses by numbers, but that doesn't mean Y2K isn't important. "We expect to be fully compliant by year's end," she said.

The company included Y2K information in its March 10Q filing.

Meanwhile, a Dell spokeswoman said the company reports everything the SEC wants for investors on its Web site.

Other companies, including Microsoft, EMC Corp., Oracle Corp., Cisco and IBM, didn't return calls by press time. ▶

XML May Make Accounting Easier

Data-sharing spec made to link financial data

BY THOMAS HOFFMAN

THE AMERICAN INSTITUTE of Certified Public Accountants (AICPA) and the nation's Big Five accounting firms are developing an Extensible Markup Language (XML)-based specification that's designed to make it easier and cheaper for companies to share financial information.

The specification, currently known as XFRML (XML-based Financial Reporting Markup Language), will be freely licensed when a functional version is released, which should be in March, said Louis Matherne, information technology director at the AICPA, a national association of certified public accountants that boasts more than 330,000 members.

XFRML would make it easier for

THE SPEC will be freely licensed, says Louis Matherne of the AICPA

companies to share financial information from incompatible spreadsheets and other applications across disparate operating systems such as Windows NT and IBM's OS/390 mainframe software, said Wayne Harding, a vice president at Great Plains Software Inc. in Denver and chairman of the AICPA's high-tech task force.

Matherne and Harding both declined to project how much time, and therefore money, the specification could save companies that use it. However, Harding said prototype financial reports developed at Great Plains were created in a fraction of the time it would have otherwise taken to develop them. The prototypes were funded by the AICPA, noted Harding.

The AICPA, which has been developing the specification for the past year with big accounting firms such as Ernst & Young LLP, will roll out prototype versions of XFRML to about 10 companies in different vertical industries to "validate" its model, said Matherne. ▶

Bell Aims at E-Business-to-Business

BY THOMAS HOFFMAN

Bell Atlantic Mobile is taking lessons it learned from its consumer e-commerce efforts and applying those to the business-to-business space, where analysts say the big money is.

The Bedminster, N.J.-based division of Bell Atlantic Corp., already the largest wireless carrier on the East Coast, launched a service last month that allows its biggest corporate customers to hot-link their intranets to its Web site (*www.bam.com*) for employees to order pagers and cell phones.

In June, the company began offering its so-called B2B customers an online billing service that enables purchasing managers to pay their companies' wireless bills online and analyze usage patterns, such as how many roaming calls employees make and the ratio of long-distance to local calls.

It is also promising a series of undisclosed e-commerce initiatives later this year to reshape the way retailers sell its products online.

E-commerce is also helping Bell Atlantic lower the cost of acquiring new customers, which is about one-tenth online what it would cost the company

through its traditional sales channels, said Roger Gurnani, vice president and CIO at the $4 billion unit.

Online sales require "no human intervention, and we don't have to pay salespeople" commissions on products sold, said Gurnani.

Bell Atlantic Mobile, which counts AT&T Wireless, Sprint PCS and Nextel Communications among its competitors, launched an online store for consumers last September. It recaptured its six-figure investment within six months. That's partly due to consumer-friendly policies that include absorbing all shipping and handling charges for merchandise and constantly adding new features, such as the ability to buy and replenish calling cards online, said Matherne. The company's base of 6.7 million customers is expected to double within the next six to eight months following its merger with GTE Corp.

Bell Atlantic's business-to-business e-commerce prospects are good, even if its strategies lag behind those of e-commerce leaders like Dell Computer Corp., said Andy Bartels, an analyst at Giga Information Group Inc. in Norwalk, Conn. ▶

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IBM

Firms Turn to Russia to Staff Y2K Projects

BY STEWART DECK

Some companies are going far off the beaten path to find skilled technology workers — to Russia, where there are many programmers knowledgeable in legacy languages.

Sapiens International Corp. in Tel Aviv has built a year 2000 remediation niche and staffed it almost fully with immigrant Russian programmers.

"Few companies have been working on converting or remediating [mainframe] assembler languages, and there are plenty of systems in the world that were written in assembler and are still quite functional," said Arie Rochman, manager of the International Solutions and Services Center at Sapiens.

Two years ago, Rochman found a community of recent Russian immigrants in Israel who had learned assembler programming building governmental systems for railroad, oil and auto industries. Today, 70% of his team of nearly 100 consists of Russian immigrants.

Because of U.S. immigration policies, U.S.-based companies would have to jump through hoops to get Russian program-

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JUST THE FACTS

Talent Search

Company: Sapiens International Corp.

Project: Set up year 2000 remediation team for mainframe assembler code-based applications

Staff: 70% are skilled Russian immigrant programmers

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mers, either applying for H-1B visas as temporary workers or other programs for permanent-worker status. Industry watchers said they have heard of just a few U.S. companies bringing in Russian programmers but added that such a strategy could provide big benefits.

Edmund Arranga, editor in chief of "The Cobol Report," a bimonthly newsletter in Orinda, Calif., said the former Soviet Union is a potentially rich source of skilled programmers. "Russian programmers have been very well trained and are very knowledgeable. There's a huge asset of skilled folks there, and I'm sure the payback on seeking them out and employing them can be quite high."

Arranga said it's essential for companies that use foreign programmers to make sure they get language training. "Coding isn't the problem — communication is."

Rochman said Sapiens has set up in-house Hebrew and English classes. "We also had to deal with a cultural problem: They were afraid to share their knowledge with others in their group, so we worked with them to overcome this."

Rochman's group has started learning other programming languages and has begun work on projects like line-of-business applications for euro currency conversion and converting assembler code to C code.

"These are very talented people," Rochman said. "We're lucky to have them." ▶

WORKSTYLES

What's It Like to Work at Johns Hopkins Medical Institutions

Interviewee: Steve Dlubala, database administrator
Company: Johns Hopkins Medical Institutions, a teaching hospital, patient-care facility and research center
What group are you in? "In central IT – a [database administrator] group supporting mainly patient care-oriented systems."
Main location: Baltimore
Number of IT employees: Just shy of 200 in central information technology
Number of employees (end users): "The total community is in excess of 5,000; we also have remote physicians who are accessing patient data."
Dress code: Shirts and ties, but suits not required. Casual Fridays.
Workday: "We're unofficially on flextime. Most people arrive between 8 and 9 a.m. and leave between 4:30 and 6 p.m. But on a project basis, we often have application implementations or changes on Thursday mornings, so we'll have six to 10 people here at 4 a.m."
What's most challenging about working in a medical center? "Support for the applications. We're a nonprofit organization, so our philosophy is a bit different. Our implementation deadlines are not carved in stone – if we're not pleased with an application, we can push back a

deadline and not get a lot of flak about it. But because we're a hospital and a lot of data is critical data, we have care providers who are depending on [access to] it 24 hours a day. So we're very strong on the post-implementation support side.
How many are on-call? "15 to 20 people. On rotation, you'll get called an average of six times a week after hours."
How do doctors and nurses measure up as end users? "Considering the pressures they have on them in caring for patients and needing accurate data right away, they are fairly cooperative, intelligent and responsive for the most part. Some are resistant to change, but you see that in any place."
Have you encountered much Y2K hysteria? "Yes and no. Y2K has been our biggest priority here for quite some time – since the beginning of 1998. And we have been pretty good about communicating to our user community that we are doing everything we can, and we will be ready." The one thing everyone complains about: "Parking is at a premium. We have four major garages, some surface lots and some satellite lots. Shuttle buses run from those."
Little perks: "We usually have two departmental parties a year – a summer picnic and a Christmas party."
What about a Y2K party? "Nothing formal is planned." Would employees feel comfortable e-mailing the CEO? "No, probably not. This is a large organization, and he is several levels removed. But, the CIO [Stephanie Reel], yes. She is a very responsive, receptive person, and she encourages the staff to send e-mail to her."
Quote: "I've been here 18 years. I've stayed because of a combination of being comfortable here and also being challenged by the diversity of applications and computer systems that we have here."
- Leslie Goff

SNAPSHOT

R&R Spots

What were the most popular vacation destinations of your IT staff this year?

55% Beach

38% Staying home

35% Mountains

18% Going abroad

Base: Survey of 150 IT managers at companies with 500 or more employees; multiple responses allowed

SOURCE: COMPUTERWORLD INTELLIGENCE UNIT - FRAMINGHAM. MASS.

ED YOURDON

Y2K and the employee

WHEN ASKED ABOUT the impact of the year 2000 on their employees, many corporate managers are quick to respond, "Our employees have nothing to worry about. We are fully compliant, so Y2K won't affect them at all!" Oh, really? Consider the simple follow-up question, "What about vacations?" Police officers,

nurses and FBI agents have already been told that they won't be allowed any vacation immediately before or after Jan. 1. But what about the IT department staff? Some companies have informed their staffs of vacation restrictions, but many have not.

How else might year 2000 affect your employees? Consider health and medical insurance: If an employee sustains an injury on the job or en route to work because of a Y2K-related disruption, will your corporate insurance policy cover the expense? Have you read the fine print of the policy to see if a Y2K exclusion has mysteriously appeared in the latest version? Do you operate in a state that has "monopolistic" workers' compensation insurance — that is, where the only source of such insurance is the state itself? If so, check to see whether your state has passed legislation exempting itself from any lawsuits associated with Y2K disruptions.

Employees also worry about their 401(k) retirement plans. Your company has probably made arrangements with a financial-services firm to administer such a plan, and your organization presumably verified that the firm itself is Y2K-compliant. But can your employees get hard-copy records of their accounts at the end of the year? Has your financial-services firm set a deadline for such requests? What about employees who want to borrow against their 401(k) plans to fund their personal Y2K preparations, or the "doom and gloomers" who want to terminate their retirement plans and bury the money in their back yards? Have you told them what procedures must be followed?

On a less dramatic note, have you determined when employees will be expected to come to work in the post-Y2K era and when they can stay home? If there is a power outage in their homes, must employees come to work? If public transportation is disrupted, do you expect them

to find some other way to reach the office? If the mayor or governor asks citizens to voluntarily stay home except in the case of an emergency, do you expect your employees to honor or ignore the request? If they stay home, will it be counted as a vacation day, a floating holiday, a sick day or unpaid leave?

What about the employees' children? If schools are closed in January, do you expect your employees to stay home or bring their children to work? Some schools may announce extended Christmas vacations at the end of 1999, but some may be forced to close unexpectedly because of infrastructure disruptions; thus, your employees may or may not be able to plan. If forced to choose, almost all employees will sacrifice a day at the office to care for their children. If you establish reasonable policies in advance, it may minimize the need for difficult, unpleasant choices.

Perhaps the most sensitive area of employee concern involves personal preparedness. For instance, should your organization offer advice on stockpiling food, water, candles, blankets and cash? Some organizations will adopt a "don't ask, don't tell" approach and refuse to get involved. Others will provide a list of resources and information, such as the Red Cross guidelines for personal preparedness. A few will perhaps subsidize the cost of such personal preparations. Obviously, every organization has to do what's appropriate for its culture and circumstances.

Many executives are uncomfortable discussing these topics, but it's not something that can be avoided. Sooner or later, employees will start questioning their managers, so the policies need to be discussed and established now, rather than on Dec. 15. ▶

> *Perhaps the most sensitive area of employee concern involves personal preparedness.*

Yourdon heads the year 2000 service at Cutter Consortium in Arlington, Mass. Contact him at www.yourdon.com.

A Day in a CIO's

Veteran IT leader **Richard Koeller** has taken on a mammoth challenge. As CIO for Chicago Public Schools, he's been called upon to overhaul IT and widen the use of technology in the classroom. *Computerworld* spent a day with him to see how he pushes his agenda forward, one day at a time
By Rick Saia

Richard Koeller

PHOTOGRAPHS BY MARC BERLOW

T HE FACE of Martin Luther King Jr. is a noticeable presence in the downtown Chicago office of Richard D. Koeller. The black-and-white profile contains this inspirational quote from the slain civil rights leader: "It's up to us."

Hanging a few feet away, on an adjoining wall, an enlarged, mounted color photo shows several middle-school-age boys working at computer terminals. All five have attention deficit disorder, according to Koeller, and the computers have captured their attention. He says the scene shows how the department he heads, Information Technology Services (ITS) for the Chicago Public Schools (CPS), is heeding King's call.

Koeller, the CIO, has been on the job for a year, having left a similar post at Nissan Motor Corp. The private-sector information technology veteran of about 30 years returned to his home state to work for the first time in the public sector.

"I'm totally challenge-driven," he says. "This is an area where I know computers can make a difference."

The timing seems right for a turnaround: The Chicago school board was convinced it needed a CIO and was overseen by a powerful mayor — Richard M. Daley — who has responsibility for the public schools for the first time. This has laid the foundation for educational change, Koeller says.

Koeller's mission is threefold:

■ To create a technology and policy infrastructure that provides state-of-the-art technical support for all staff and students in the 600-school district.

■ To educate teachers and school administrators so they can make the best use of IT.

■ To improve computer literacy for the more than 430,000 students by adding computers to each school, aided by federal money to help connect them to the Internet.

To do it, Koeller has to persuade principals and administrators, who he says are used to calling the IT shots for their schools and departments, to cooperate as he implements the standards and controls that are needed to accomplish these goals.

After a year on the job, Koeller says he believes his department has accomplished more than anyone, including himself, thought possible. He has built a staff, blending contractors with Chicago's public school employees. ITS has also implemented two modules of a 14-module Oracle Corp. system that will give all schools and the central office access to the same financial and human resource information. ITS has also completed infrastructure assessments of nearly all schools, laying the groundwork for more computers in classrooms.

"We very clearly have a vision for the next three years," he says.

But, as *Computerworld* found out, Koeller may spend any given day in that three-year span not only advancing the vision among CPS insiders and outsiders, but also keeping IT vendors in line and stressing to his staff the need to communicate the IT message effectively.

BUSINESS

Life

July 27, 1999

It's a bright, sunny day in downtown Chicago, a little on the humid side. On the third floor of the board of education building on South Clark Street, Koeller, coffee in hand, walks from his office into a conference room across the hall.

9:10 A.M. Koeller's 10 minutes late entering a meeting of his 11 direct reports. The meeting is led by Katherine Gehl, his director of strategic program planning. But he doesn't wait to jump into a discussion about hardware and software strategies and updating guidelines on how the schools can best buy PCs. His aim is to establish a staff to advise principals on PC purchases. Koeller urges those involved to bounce ideas off the department's advisers at Gartner Group Inc. in Stamford, Conn. "If we get off our rear ends and use the service, it's worth the money," he says.

Koeller is displeased at news of a vendor that's late in responding to ITS after the board of education approved a purchase. Under CPS rules, any expenditure of more than $10,000 that the board approves must be written into a contract within 60 days or the approval expires — delaying, thwarting or perhaps killing a technology initiative. The vendors must know the rules, Koeller says, and those "who don't respond on a timely basis are out of here."

Next is the year 2000 problem. Koeller tells of a recent conversation with Paul Vallas, the schools' CEO. "He said, 'Rich, if [the schools] fail on Y2K, you fail.'" He uses the exchange to dramatize Y2K's importance. "So, we now have a new No. 1 priority — it's year 2000. Period. We can't fail on year 2K," he says. (ITS's goal is to have code tested and validated by Nov. 1, he says.)

Koeller also urges trimming ITS's long roster of contractors in favor of hiring more staff. ITS can't compete with private industry for "expensive jobs," he says, but can in the $50,000-to-$100,000-per-year salary range. The chance to work in a pleasant, forward-moving environment might provide a prospective employee enough of a challenge, he reasons.

Koeller then distributes copies of a draft report on ITS's progress that will be submitted to Vallas. He stresses that the report must be written in language that the CEO will understand (read: nontechnical; at a brief encounter later in the day, Vallas playfully chides Koeller's occasional use of technical language). "I want to know of anything you see in this report" if it's too technical or unclear, Koeller says.

10:30 A.M. Koeller meets with Phyllis Tate, a former principal who is Koeller's "bridge" to school principals. They're preparing a presentation they will make to the principals at a three-day conference in mid-

August. The chief focus is a nearly $300 million IT infrastructure plan that will network schools and expand educational use of computers by 2001. The goal is to wire 25 schools per month during the next two years and connect them to the Internet over wide-area networks. Helping are millions from the federal "e-rate" program, which will cover 87% of the schools' costs to connect to the Internet (last month, CPS was awarded $62 million for the 1999-2000 school year, Koeller says. CPS expects more money next year).

NOON Koeller and strategic planner Gehl take a 15-minute cab ride to the University of Chicago for a luncheon meeting. En route, Gehl talks about the written report to Vallas. Vallas' chief of staff, Diane Grigsby-Jackson, has suggested some changes before it goes to the CEO. Koeller tells Gehl to relay the changes to the ITS contractor who helped assemble the report. "If we ever lose control of this presentation, I'm dead," he tells her, emphasizing that ITS must monitor and approve each change. He notes that there will be different versions of the report and wants to make sure the right one is sent to Vallas. He tells Gehl: "You take this one from start to finish."

12:30 to 1:45 P.M. The luncheon is hosted by Don York, an astronomy professor who serves as the university's head of the Chicago Public Schools/University of Chicago Internet Project. York, Gehl and Koeller touch upon several issues, including a proposal for a project that would pair IT managers in the private and public sectors with principals to help extend technology education. Koeller uses the opportunity to stress his goal of a common IT infrastructure, which the principals are not used to having. To make a PC Y2K-compliant, ITS should install a Windows NT operating system and "blow off" software that was loaded by someone outside his organization, Koeller says, adding that ITS must tell the principals: "If you don't have this on your desktop, you can't be on our network."

2:15 P.M. In his office, Koeller checks his voice mail, then sits down to meet with three staffers about the wiring portion of the infrastructure project. This could cost up to $200 million, but Koeller has been assured of only about $160 million and wants to stick to the goal of wiring all the schools. He tells the trio to look at the scheduled sequence of hookups and suggest how ITS could reach the goal without the $40 million, but warns not to upset principals who have worked hard to get computers in their schools.

3:05 P.M. Koeller's next meeting is with two staffers to review a vendor's letter. The letter complains that Koeller's staff is preventing the vendor from installing software on its system. This is part of the problem he inherited. With no integrated technology plan, administrators were calling many IT shots, he says, even hiring their own IT vendors, as occurred here.

"I get angry" when he sees a letter like this, Koeller tells Julie Riegler and Mukesh Gangwal, two Andersen Consulting contractors assigned to work with ITS. He instructs Riegler to talk with the vendor and line up a meeting by October, at which Koeller will lay out the new rules on software installation.

4:45 P.M. Administrative assistant Marlene Koski briefs Koeller on upcoming appointments.

5:05 P.M. Koeller meets with Gehl in his office to

RICHARD KOELLER, in the blue shirt, listens as Katherine Gehl, at his left, makes a point at a meeting

DISCUSSING technology in schools with Duel Richardson, left, and Don York from the University of Chicago

FIELDING a phone call in his office

JULIE RIEGLER from Andersen Consulting reviews notes while Koeller discusses a letter from an IT vendor

discuss about a dozen items, including an upcoming visit from the CIO of Detroit Public Schools.

It's also time for Gehl's weekly mentoring session with Koeller. Koeller says he believes strongly in that aspect of the job and adds that the public sector is "way behind" the private sector in guiding tomorrow's business leaders. Koeller says he mentors about 20 people, including all his direct reports, "to get them to the point where I don't have to do anything." Any CIO "worth his or her salt" must do this to prepare for the day when he or she leaves, he adds.

The meeting ends at about 6 p.m. Koeller walks to a nearby restaurant for dinner before heading home. ▶

WARMING UP TO YOUR NON-IT IT BOSS

Increasingly, supervisors and managers in charge of IT aren't from the ranks. This can lead to some special employee-employer challenges
By Melanie Menagh

TECHNOLOGY is technology. Business is business. And never the twain shall meet. Wrong. From three-person start-ups to Fortune 100s, information technology staffers often have to to get up close with non-IT folks who call themselves the boss.

How can you best get that nontechnical boss to understand you, appreciate your ideas, feel your pain? Communication is key, and successful IT leaders say the best way to foster that is not to get your boss to feel your pain, but to understand a little about his.

"When I speak to my [non-IT] bosses, I put myself in their shoes," says Martin Ringle, director of computing and information systems at Reed College in Portland, Ore. "How do they see the world? What are their priorities?"

The thing to do is to revamp your thinking. Put yourself in their wing tips.

"There is no such thing as an IT project," says Gary Sutula, senior vice president and CIO at R. R. Donnelley & Sons Publishing Corp. in Chicago. "There is a business initiative that has IT implications. You're doing a disservice to say to your boss, 'I have an IT project.' You have to orient yourself to their perspective, explain your ideas to them in terms of their needs, orient your boss to sponsorship and ownership."

Here are some basic rules to make the journey smoother:

Brush up on your boss' side of the business. "It's not his job to understand my business; I have to understand his," says Scott Farr, project manager of the data warehouse at Dartmouth-Hitchcock Medical Center in Lebanon, N.H. He suggests: "Get exposure through meeting with their department. We in IT try to encourage them to invite IT to sit in on meetings."

Try to chat with the non-IT boss whenever possible. "The more informal contact you have, the better," says Davis Keyes, senior vice president of information systems at Protective Life Corp. in Birmingham, Ala. "You shouldn't wait for the big presentation. Have a lot of little conversations. This builds communication and credibility."

"You really need to get people on board to build that confidence and trust," says Ringle. "Talk to them often. It's easy to get tunnel vision and think IT is the center of the world."

Attend non-IT conferences for your boss's peers. "Get an understanding of your bosses in their context," says Ringle. "Find out the major issues their industry is dealing with."

Do it *mano a mano*. "The best way to understand their agenda is one-on-one, not at a meeting where you're listening to the oration and the press-release version," says Ringle.

"If I have a major purchase to propose, I talk to the individuals before going into the big meeting," says Keyes. "I do my homework, offer them background, all the financial implications."

This, say the experts, is a good way to bring people to your side, not springing something big on them in a conference room. "You can't do it in the hallway. Get an appointment," says Sutula. "Don't let it go more than a half-hour. Make it a quick burst, then get out."

That's especially true before a major presentation. "If I have a difficult subject ..., I'll do one-on-ones and bring everyone up to speed beforehand," Sutula says. "I'll say, 'Let's have a conversation about an area that's experiencing change; here's some background.' Sometimes I'll send them some materials to help familiarize them."

Always ask questions. "Don't be afraid to say to them, 'I don't know,' " says Keyes.

Respect the non-IT boss's time. "Take advantage of the few minutes when you have their undivided attention. Make it quick and to the point," says Keyes.

"Don't be boring," says Sutula. "Go prepared. If you have a half-hour presentation, figure out what you are trying to achieve and how can you put that onto one slide."

Respect their abilities. "Non-IT bosses are pretty savvy," says Ringle. "You can't just stereotype that that financial person is a bean counter and is shortsighted." You can do a lot to help fill in gaps in the nontechnical boss's knowledge.

"I send them materials from magazines and journals. I encourage the executive team to go to outside classes,
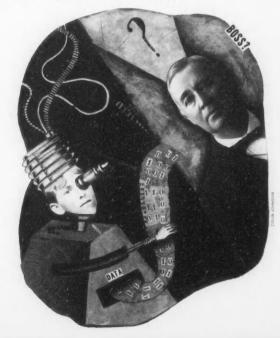
says Sutula. "One of the hallmarks of an executive is judgment. They make very astute decisions."

Many IT people have yet to learn a primary skill: Listening. "We've got to listen," says Farr. "If we don't, we turn off the managers. Their reaction is, 'IS doesn't know how to deliver what we need.' "

"IT is very new," says Ringle. "Business managers have been around for hundreds of years. You're dealing with people whose expertise is much more sophisticated because it's had much longer to evolve and refine. You've got a lot to learn from them about things that are important, enduring."

Menagh is a freelance writer in Maple Corner, Vt.

By the Editors of Computer Technology Review®

SETTING THE PACE OF INDUSTRY

SNIA: Toward The Information Utility

BY FRED G. MOORE

Vision is not seeing things as they are, but rather seeing things as they will be. Fifty years ago, people would often store their money in their home under a mattress or in a box. Even though banks were common and gaining popularity, many thought that the risk was too high to let someone else keep their most valuable asset: their money. But the banks had vision, they realized that if they could guarantee that people could more safely store and retrieve their money than they could at home and that it would always be available, they would create a financial storage utility that people everywhere could access. To further encourage new business and growth, the banks decided to add value to the money deposited and increase its value by offering interest and dividends. It wasn't too long before the banks became a financial utility for virtually everyone.

The banking model also serves as an example for the exploding data storage industry. As money was the most valuable asset for the individual a half century ago, the next century promises that data will be the most valuable asset of the information-based society. Can we guarantee that someone can safely store and retrieve their data today? Not just yet, but we are getting closer. The IT industry has undergone an evolution in data storage since its beginning. Throughout the 1970s and 1980s, storage deployment could be described as a Many-to-One with all storage devices connected to the server, typically a mainframe. During the late 1980s and 1990s, a one-to-one relationship developed between the server and storage devices.
Devices were dedicated to a particular server, as departmental and distributed servers became widespread. Servers and storage were co-located. The LAN had now materialized. This decentralized approach created islands of computing and storage that were costly to manage and replicated hardware, software, and personnel across these isolated nodes of computing and data. Most often in this computing model, data was not accessible to another server in the LAN in case of failure and applications that weren't in a clustered or an SMP (Symmetrical Multi-Processor) designed system were unavailable until they could be restarted. The most critical and valuable element of the enterprise, the data, was too often unavailable and the costs for an unscheduled outage remained severe for most every business. Like the bank, the evolving storage industry also has a vision and it has arrived in the form of the Storage Area Network (SAN).

The long journey for the SAN is just beginning, but it promises to bring to the Information Age a roadmap needed to transform islands of data to the level of a true utility, universally accessible, sharable, and ubiquitous. The SAN may be ahead of its time, but is not ahead of its vision. The longer view for SANs significantly challenges and eventually replaces the traditional practice of using a general-purpose server as a storage repository. The high-speed network fabric constructed from storage interfaces connects a pool of data storage devices to a group of servers and allows storage devices and servers to be added and removed independently of each other. In the SAN, data is shared rather than connected to and owned by a server. An unscheduled outage on a server need not affect access to data in the SAN model.

Where are we on this journey? Is the roadmap developed and supported by all of the providers of SAN components? Do we presently have agreement on standards, the network fabric, security rules, interfaces, common storage format, and the necessary software to manage the SAN resources and standards as the banking industry has? Answers to these questions actually form the basis for the SAN roadmap and most of these issues remain unanswered. SNIA (Storage Networking Industry Association) must be successful. We must make it work. Our choices are yesterday or tomorrow. SNIA gets us to tomorrow. Without quick and effective work from this critical group for the storage industry, we will arrive at yesterday's model and will spend years trying to tie numerous proprietary-computing islands together. Today, we continue to tactically debate over Fibre Channel, SSA, and SCSI interfaces as to which one is better for the SAN fabric. Longer-term, it doesn't really matter which interface we choose since interfaces will continue to evolve, improve, and be replaced. There will be several choices. Will wireless ever become a SAN interface? Step out of the box for a moment. Imagine in our vision the day arrives that the wireless SAN (another fabric) evolves and each one of us becomes a node on a SAN. Just as an example, biometrics is the discipline of life measurement and early tests are underway to help patients, athletes, and airline pilots, among others, monitor bodily conditions. Using wireless and wearable computing appliances, continual biometric feedback about our physical condition will be constantly sent, analyzed, and returned to us to warn of critical bodily conditions.

The SAN journey definitely lies ahead of us. Everyone today can have the same server, the same storage devices, the same software products and network topology, but no one can have your data. We have taken the first few steps in a fifty year evolution of computing that has seen the DNA of the IT industry become the data itself. The excitement surrounding SANs is real and the promise of the SAN, like that of the bank fifty years ago, becomes the foundation for a new utility, the information utility.

From the editors of

Computer Technology Review

A West World Productions Publication

This special supplement and additional working group technical documents are online at www.snia.org

Fred G. Moore is the Editor-in-Chief, Storage of *Computer Technology Review, Storage Inc.* and *Storage Management Solutions.* He is founder and president of Horizon Information Strategies, Inc.

SETTING THE PACE OF INDUSTRY

Report From The Chairman

BY PAUL BORRILL

Two years after the inception of the SNIA, we find ourselves having grown from a glimmer in the eye of our first President: Michael Peterson, to a rapidly expanding and substantial organization, serving many facets of our industry with conferences, education, and major forums to develop and review standards. It is clear that the SNIA is now at the epicenter of the emerging Storage Networking industry. The members of the board of the SNIA are committed to building an organization with a resilient structure that can adapt quickly to new challenges and the rapidly changing landscape that defines our industry. We are now poised to transition the SNIA from a volunteer-constrained, vendor-based focus to a new organization that can respond to the needs of the international IT community with a full time staff and a broad mission to develop conferences, education, and interoperable standards for heterogeneous SAN and NAS technologies.

With the support of our member companies, we are focusing the SNIA to be a "driver" for the Storage and Networking Industries and adopting "Setting the Pace of Industry" as our theme. We foresee a new era of cooperation that will accelerate our vision of building shareable multi-vendor Storage Area Network (SAN) subsystems that reliably interoperate, and in defining Network Attached Storage (NAS) Technologies that can provide common services, interfaces, and management infrastructures to strengthen the foundation of this emerging industry. With a strong, well-supported standards body, manufacturers will be able to bring products to market faster and more efficiently, customers will have access to compatible products and the entire industry will grow more rapidly: This is the ultimate win-win situation.

Our organization now includes board members from all the major Storage Systems vendors. We have a new Chief Technical Officer, a Technical Council to oversee the standards developments within the organization, a Conferences department, a major new Web presence, developed by our new Web Committee, and we are well down the road to providing educational services and support for the industry with our Storage Networking University programs.

In the past 12 months, the SNIA has added six members to its board, formed seven new operating committees, as well as secured the support of a full time executive director and a full time technical director. In addition, we have created and staffed (with some of the best experts in the industry) a Technical Council to develop and evolve our standards development roadmap. During this period of unprecedented growth, we have also been careful to put in place the necessary management infrastructure and controls to ensure resources are used wisely and that our energies can be focused to create measurable results.

SNIA's goals for 1999 are to provide:

• A cooperative forum for driving multi-vendor interoperability for both hardware and software

• An education center supported by a Web site (www.snia.org), conferences, and technical publications

• A technical council and working group infrastructure for the development of technical standards

As an integral part of our strategic plan in 1999, we have become more global in our thinking and our presence. In September of this year, we will hold our first SNIA-Europe event in London and we are also under way with discussions on how to add a SNIA-Asia operating center for the future.

The SNIA serves you, our members, and the International IT community. We are proud of our progress so far, but will continue to need the creative energies of the entire industry in order to digest the mountain of work in front of us so that we can create the industry infrastructure for Storage Networking that will rapidly enable the massive markets for storage systems and applications that we all now agree will be part of an important future for all of us.

Dr. Paul Borrill *is the chairman of the Storage Networking Industry Association (Mountain View, CA).*

Report From The Vice Chairman

BY ROGER REICH

It's the great experiment. Every major industry has an association of manufacturers that works to expand the market by promoting its wares—"Got Milk." The Storage Networking Industry Association (SNIA), in addition to being a marketing and promotion engine, for the first time is bringing competing manufacturers together to jointly engineer a milk that tastes better. The Holy Grail of this engineering effort is the desire to make products from multiple Storage Network vendors interoperate reliably. Should the industry be able to provide plug compatibility, an IT consumer would be free to select any product (hardware or software) from any manufacturer, allowing them to optimize price, function, reliability, performance, serviceability, and product availability across competitors at any time in their procurement cycle. In short, for the computer storage industry, better tasting milk. Better tasting milk equals a fundamentally larger market for all the manufacturers to share; more profitability, and more jobs.

The vice chairman of the SNIA carries the dubious role of attempting to get the volunteers from these competing manufacturers working together efficiently (to make better tasting milk) and to "back-up" our Chairman, Paul Borrill. In summary, the Al Gore of the SNIA.

During the past year the SNIA has evolved enormously in its efficiency, controls, and productivity toward this vision. This evolution has been driven by:

• Retaining full time executives for the organization to aid in "execution"
• Casting each board-of-director member into carrying direct functional responsibilities
• Using Board-of-Director meetings as working forums to drive organization progress
• Creating a formal set of living Policies and Procedures that:

  • Precisely define our Mission and Vision
  • Sets timelines and deliverables for annual planning
  • Assigns functional responsibilities to board members
  • Defines voting and election rules
  • Establishes membership classes and related rights for each class
  • Create and monitor working committees
  • Defines responsibilities for and obligations to full time staff
  • Enforces a process for the review and approval of technical standards and PR materials
  • Casts Guidelines for Intellectual Property and Antitrust

The SNIA is a growing and vibrant organization of tremendous potential, as the task of building interoperable Storage Networks is both enormous in engineering scope and customer value. Participating in the leadership, the SNIA has been an excellent investment of energy in a highly entrepreneurial environment that has yielded invaluable industry contacts. I believe in SNIA's purpose and cherish the investment of my energy. I encourage everyone in the storage industry to actively participate in its progress. In two years from its inception, the SNIA has evolved to become the center of the network storage industry. With increased support, the SNIA will define and promote the next "open" technological step for the storage industry.

Roger Reich *is the vice chairman of the Storage Networking Industry Association (Mountain View, CA).*

HOWARD ALT, CHIEF
TECHNOLOGY OFFICER

IT departments want open, heterogeneous storage systems. In response to this demand, the Storage Networking Industry Association (SNIA) is taking definite steps to ensure that storage networks are open, complete, efficient and trusted solutions across the IT community. The SNIA is also committed to delivering standards, education, and services that will propel open storage networking solutions into the broader market. In order to win the trust of the IT community and propel storage networking, the SNIA is focusing on the following critical technical issues:

Technical/Engineering Integrity

The SNIA will accelerate debate in storage networking technology through the solicitation of proposals to be presented in rigorous technical tracks at SNIA conferences. By issuing industry-wide calls for papers and offering refereed papers and conference proceedings, the SNIA will serve as a forum for

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the best thinking in the industry. The Technical Council (TC) will review all proposals to assure the highest level of technical quality. In addition, the TC, the CTO and the SNIA's Technical Programs Director, supported by the SNIA's working groups, will develop a technical roadmap and deliver storage networking architecture, standards and APIs that will assure interoperability in logical progressions without duplication of effort.

Delivery Of Standards

To deliver standards quickly and efficiently, the SNIA is developing a comprehensive technology road map. As such the SNIA will:

- Determine standards (protocols & (APIs) necessary for a complete storage system to operate.

- Work to establish a clear and concise framework that will not duplicate, but enhance the work of other standard bodies.

- Establish priorities.

- Establish timelines and milestones.

Interoperability

True interoperability will be difficult to achieve. The SNIA is well aware that standards do not equal interoperability. As such, the SNIA will take responsibility to promote a culture where true interoperability will be recognized within the network storage industry. To ensure the technical integrity of standards as well as the promotion of interoperability, the SNIA will create an arduous review process for all proposals submitted to the organization. The review process will be conducted by the TC, the CTO, and the Technical Programs Director, and will require a minimum of two working implementations before any submission is considered to be of full standard stature. Of course, work in process can be viewed by member companies to point the way for their implementations. ■

SNIA Definitions

In any branch of technology, communication is facilitated if key terms are understood and used consistently among vendors and end-users. The following definitions of key storage-networking-related terms were created by the SNIA as a first step toward the association's concerted efforts to create a common language in the storage networking industry:

Storage Networking

Storage Networking is the practice of creating, installing, administering, or using networks whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements.

Storage Area Network (SAN)

A Storage Area Network (SAN) is a network whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements. A SAN consists of a *communication infrastructure*, which provides physical connections, and a *management layer*, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust.

Note: The SNIA definition specifically does not identify the term SAN with Fibre Channel technology. When the term SAN is used in connection with Fibre Channel technology, use of a qualified phrase

such as "Fibre Channel SAN" is encouraged. According to this definition an Ethernet-based network whose primary purpose is to provide access to storage elements would be considered a SAN. SANs are sometimes also used for system interconnection in clusters.

SANs may enable:
- Sharing of heterogeneous storage resources among heterogeneous systems
- Consolidation of storage resources
- Separation of storage traffic from application traffic
- Independent scaling of computing and storage resources
- Centralized management of distributed storage resources
- Fault-tolerant data access

SAN-Attached Storage (SAS)

SAN-Attached Storage (SAS) refers to storage elements that connect directly to a SAN and provide file, database, block, or other types of data access services to computer systems.

Note: SAS elements that provide file access services are commonly called Network Attached Storage, or NAS devices.

Network-Attached Storage (NAS)

Network-Attached Storage (NAS) refers to storage

elements that connect to a network and provide file access services to computer systems. A NAS Storage Element consists of an *engine*, which implements the file services, and one or more *devices*, on which data is stored.

Note: NAS elements may be attached to any type of network. When attached to SANs, NAS elements may be considered to be members of the SAS class of storage elements.

Characteristics of SAS and NAS may include:

- Simplicity of installation, use and maintenance
- Independent scaling of computing and storage resources
- Sharing of storage resources among heterogeneous computer systems
- Provision of shared data access to heterogeneous computer systems
- High data availability

Storage Element

In the context of these definitions, a Storage Element is any device designed and built primarily for the purpose of persistent data storage and delivery. This definition is specifically intended to encompass disk drives, tape drives, RAID array subsystems, robotic tape libraries, filers, file servers, and any other types of storage devices.

SNIA Technical Council

BRAD STAMAS, CHAIRMAN, TECHNICAL COUNCIL
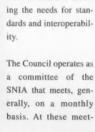
In mid-1999, to accelerate the development, evolution, and acceptance of multi-vendor storage network standards, the Storage Networking Industry Association (SNIA) formed the Technical Council to guide and oversee SNIA technical efforts and standards development. The Council consists of a team of the finest experts in the industry acting as architectural, as well as technical advisory body to the SNIA. They report to the SNIA board of directors through their chairman and work closely with and in support of the SNIA working groups, the SNIA chief technology officer, and the technical programs director. The Council's mission is to support the SNIA in pursuing coordinated and focused technical work efforts.

The Council is chartered to address those technical issues that are beneficial to vendors, resellers, and end-users of the storage networking industry at large. The Council will define the scope of SNIA technical activities, create and maintain a roadmap, and provide the high-level architectures guiding its technical development. The Council will also recommend the scope of SNIA technical bodies (work areas and Work Groups) in order to prioritize and focus technical work efforts within the SNIA. They will monitor other standardization and outside technical efforts to prevent unnecessary duplication within the SNIA. They will recommend and prioritize the areas where the SNIA will be most effective in defining the needs for standards and interoperability.

The Council operates as a committee of the SNIA that meets, generally, on a monthly basis. At these meet-

ings, in addition to addressing roadmap and architecture activities, the Council will accept and consider technical proposals submitted by SNIA members. Proposals will range from requests to validate the charter of a new working group to the review of submitted specifications for inclusion into the SNIA body of work or standards. Often, the Council will be expected to establish a recommendation on a proposal and forward this to the board of directors, chief technical officer, or voting membership for action. In developing its positions or recommendations, the Council will also make use of expert sub-groups and invited 'experts.' This will allow input from other SNIA member individuals and outside subject matter experts.

Proposals and actions currently in front of the Technical Council include:

* Review of interfaces and architectures and would enable support of a multi-vendor Trusted Shared Storage Environment

* Request to develop a position and a methods to resolve security issues related to storage networking

* Request to define and promote a working group to address issues relating to multiple methods and approaches to resource discovery in storage networks

The Council is comprised of both member-selected and Board-appointed experts to ensure member representation and to keep the TC connected with all parts of the association. Council members are individuals with significant experience in creating systems architectures for storage, storage management, or storage network systems. They are each knowledgeable of current technical issues in SAN and NAS systems, and understand end user requirements for storage networking. There are key individuals from leading system, storage, storage interconnect, and storage management companies on the Council. As a group, expertise in all aspects of storage networking is equally represented.

Brad Stamas *is the chairman of the SNIA Technical Council (Mountain View, CA).*

SNIA Technology Mission

MIKE KOLESAR, ACTING TECHNICAL DIRECTOR

The demand for large storage applications is creating a rapidly evolving industry. No longer merely a peripheral to localized computing resources, networked storage is mission-critical technology on its own right. The ever-rising demand for storage availability and volume from applications ranging from data warehousing to multimedia means that enterprises are spending increasingly large sums of money on storage products. The storage area network (SAN) technology, enabled by such high-speed serial links as Fibre Channel, can provide much needed shared storage networks with dramatically reduced cost of ownership. IT customers also want SAN technology that is reliable, secure, flexible, scalable and manageable, with industry standards that would ensure interoperability among all existing and developing systems.

The SNIA was established to respond to this pressing need for standardization and interoperability in the emerging storage networking industry. Technically, the SNIA's mission is to develop Standards, APIs (Application Programming Interfaces), white papers (on issues and challenges as well as solutions), demonstrations of interoperability and Forums for discovering and resolving technical issues. To that end, the SNIA has formed the SNIA Technical Council and working groups to accelerate the standardization process. The Technical Council's goal with the strong support from the working groups is to provide vendors with the support they need to build storage networking products—both hardware and software that interoperate and can be mixed to form complex storage interconnect. This interoperability will provide the basis for the storage solutions customers need. The standardization will enable IT organizations to shift much of their total cost of ownership from management labor to purchasing storage equipment and management tools. Today, the SNIA consortium of over 110 companies is aggressively establishing this storage networking-based vision of the future.

As a first step toward industry-wide standardization, the SNIA has identified several impediments to interoperability in the existing environment: First, the physical and logical level transport protocols for the Fibre Channel Interconnect do not always interoperate for devices from multiple vendors. Second, there is "white space" or missing-functionality at all levels that must be supplied/sketched to enable solution-level mix and match. Only controlled and tested limited configu-

rations and topologies today. Third, many device have their own specific discovery and management interfaces. This prevents the promised unified, central management from becoming practical. Fourth storage device management, when enabled over th storage network, needs to be secure to prevent anarchy or unauthorized use. This security needs to b architected to eliminate risk to user data. Fifth, dar security becomes an issue because the physical dar links may no longer be fully secure. There are als other challenging problems on a device-type bas for arrays, tapes, and switches. These specifi device-type problem areas are also being addresse as resources permit by selected SNIA work groups

The Technical Council will identify industry-wid issues and challenges, and will create and mair tain a roadmap of the standardization process. Th Council will also monitor other standardizatio efforts to prevent duplication of efforts. It will rec ommend and prioritize the areas where SNIA the proper and most efficient venue for definin the necessary standards and interfaces. Th Council will accept technical proposals fror SNIA members.

SNIA has had active work groups for well over year. The primary areas being covered are Storag Network Management, Backup and SAN Fil Systems. Within these areas, several work grour have been launched and are active. They hav already produced new APIs, proposed standarc and/or submitted to formal standards bodies. I many cases, modifications to existing ANSI or ISt standards have been proposed. This summer seve al new work groups have been proposed an launched. The SNIA web site contains the most cu rent information about the status of these ne workgroups. In general, information about the wor groups and work areas, including the chairman c each team and contact information, are publishe on SNIA's web site. This is to ensure that SNL members can get involved in any topical area c interest. New topics can be proposed to Howar Alt, the SNIA Chief Technical Officer. He wi sponsor the creation of board-approved wor groups to address the highest priority topic Additional work group ideas have been proposed t the Technical Council for consideration and the recommendation to the board.

The SNIA has studied the progress of other indus tries toward interoperability, taking the best prac tices and integrating them early on to allow SNL to set the pace for the industry by acceleratin standards and interoperability. ∎

SETTING THE PACE OF INDUSTRY

BACKUP WORKING GROUP

CHARTER:

Increasing the efficiency of creating and managing disaster-tolerant copies of online data. The backup or replication of on-line data repositories for the purpose of improving disaster tolerance is the critical issue facing IT management today. The interruption of application availability as well as the resources required to create and manage backups must be reduced as on-line storage systems rapidly grow within data centers. Storage networking technology evolution is for the first time providing the underlying tools needed to implement data movement, classification, and organizational systems that can dramatically reduce the cost-of-ownership for completing backup operations. The SNIA/Backup Working Group (BWG) is comprised of system vendors, storage component manufacturers, storage management software providers, as well as customers. It is uniquely chartered within the storage industry to develop the necessary specifications and partnerships required to improve backup operational efficiency.

Short Term Objectives:

- Collect and analyze existing standards and architectures within the industry to identify components that can be applied to the SNIA/BWG Charter. These standards and architectures may be modified and/or incorporated into work product of the SNIA/BWG.
- Develop specific functional goals for a storage network based data-mover and build a straw man architecture into which functional components can be layered.
- Develop and maintain a Web site to foster timely communications.

Enterprise Backup In Storage Area Networks

The BBWG has begun efforts to collect and analyze existing standards and architectures within the industry to identify components that can be applied to enterprise backup in a storage area network. Specifically the BWG is concentrating in the following areas:

- Extended copy
- Snaphot/Checkpoint
- Device addressing
- Session management

In backup implementations today CPU utilization and network traffic can be so high that they would leave fewer server resources to execute user and system processes. One solution to this problem is to build an extended copy feature in the SAN and perform a serverless backup, moving data directly to/from tape, offloading both the server and network of the actual data movement. Data movement in this fashion does not consume server resources, such as CPU cycles, memory or I/O, and the system can run more efficiently. The extended copy functionality can also be used for data migration and replication services such as disk mirroring and data vaulting. The BWG has developed a specification for an extended (or third party) copy command and passed the specification to the SCSI/T10 standards group, which is in the process of approval.

The BWG has identified the next three priorities for investigation: snapshot/checkpoint; device addressing; and session management. The snapshot/checkpoint capability is useful for many applications, including backup. It enables active data sets to be protected without locking out users and/or applications. While there are numerous software implementations, RAID vendors CLARiiON, Hitachi and EMC have implemented this functionality within RAID controllers. However, each vendor has provided a different API to this service. The goal of the BWG is to develop a common API for the snapshot/checkpoint functionality, which all RAID and Backup software vendors can implement.

In current SAN implementations, tape devices are attached to Fibre Channel via FC-SCSI bridges. Different vendors have selected different schemes for addressing the SCSI devices attached to the bridge. Device drivers as well as auto-configuration and management of services would be simplified by the use of one standard addressing scheme. The BWG is working to develop a uniform method for addressing devices through FC-SCSI bridges.

In implementing the extended copy functionality a number of other issues arise, one of which is how to better manage data movement and the associated resources. The BWG is investigating how to tie extended copy functionality to the management framework.

The SNIA/BWG has formed individual working groups to address the architecture and specification of snapshot/checkpoint, device addressing, and session management. The individual working groups are meeting as a team and will work with industry standards organizations to gain acceptance and ratification of the specifications. The timelines for these efforts are being developed by the subgroups and will be published as work progresses. ∎

FIBRE CHANNEL WORKING SUB-GROUP (FCWSG)

CHARTER:

The Storage Networking Industry Association's (SNIA) Storage Network Management Working Group (SNMWG) is chartered to identify, define, and support open standards needed to address the increased management requirements dictated by storage area network environments. The Fibre Channel sub-group of the SNMWG is further focused to address the management of Fibre Channel Storage Area Networks. During the next year, the SNMWG-FC working group intends to provide the following:

1. Coordinate efforts with the other sub-groups of the SNMWG.
2. Coordinate the development of appropriate Fibre Channel Management Information Bases (MIBs) and map them into CIM.
3. Develop a SAN Management Architecture specification.
4. Provide implementation guides based on the SAN Management Architecture specification.
5. Standardize the host bus adapter (HBA) management in CIM.

Managing A Fibre Channel Storage Area Network

The emergence of Storage Area Networks (SANs) has created the need for new storage management tools and capabilities. While SANs provide many benefits, such as lower cost of ownership and increased configuration flexibility, SANs are more complex than traditional storage environments. This inherent complexity associated with storage area networks creates new storage management challenges.

The prominent technology for implementing storage area networks is Fibre Channel. Fibre Channel technology offers a variety of topologies and capabilities for interconnecting storage devices, subsystems, and server systems. These varying topologies and capabilities allow SANs to be designed and implemented that range from simple to complex configurations. Due to the potential complexity and diverse configurations of the Fibre Channel SAN environment, new management services, policies, and capabilities need to be identified and addressed.

The Fibre Channel SAN Environment

Historically in storage environments, physical interfaces to storage consisted of parallel SCSI channels supporting a small number of SCSI devices. With Fibre Channel, the technology provides a means to implement robust storage area networks that may consist of hundreds of devices. Fibre Channel SANs yield a capability that supports high bandwidth storage traffic on the order of 100MB/sec. Enhancements to the Fibre Channel standard will support even higher bandwidth in the near future. Depending on the implementation, several different components can be used to build a Fibre Channel storage area network. The Fibre Channel SAN consists of components such as storage subsystems, storage devices, and server systems that are attached to a Fibre Channel network using Fibre Channel adapters. Fibre Channel networks in turn may be composed of many different types of interconnect entities. Examples of interconnect entities are switches, hubs, and bridges.

Fibre Channel networks can be built of varying scale. In smaller SAN environments, Fibre Channel arbitrated-loop topologies employ hub and bridge products. As SANs increase in size and complexity to address flexibility and availability, Fibre Channel switches may be introduced. Each of the components that compose a Fibre Channel SAN must provide an individual management capability, and participate in an often complex management environment.

Fibre Channel SAN Management Challenges

The basic management challenge stems from the fact that Fibre Channel SANs utilize a complex network for interconnecting storage devices and server systems. This network is potentially made up of multiple components that have both physical and logical relationships to one another. A breakdown in one component or link in the SAN may manifest itself differently depending on the component that recognizes the condition. However, since a SAN is a network, we can benefit by discussing the management challenges in terms of the basic systems management disciplines.
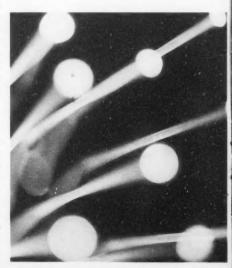
Probably the greatest challenge involves the configuration management of SANs. Due to the large number of components, and the multitude of physical and logical relationships to one another, robust configuration capabilities must be provided for the Fibre Channel SAN. There will be trade-offs between keeping track of configuration information within the Fibre Channel network, or forcing a central management platform to ascertain Fibre Channel network topology using management mechanisms such as configuration files, name services, and SNMP interactions.

There are also challenges associated with performance management of SANs. Performance information must be provided at a component level as well as an overall system level. Tools and capabilities must exist that again correlate data from a variety of components to provide a system level view of the overall SAN's performance.

Common capabilities must be provided to allow software and firmware updates to be managed from a central management station. These capabilities should allow a generic mechanism to transport updates to components from different vendors.

There are also challenges with the support of accounting or asset management. Capabilities such as standardized SAN resource identifiers containing asset information must be defined. In addition, a common mechanism must be provided to obtain the asset information from SAN resources. ∎

Storage Network
Management Working Group

CHARTER:

Identify, define, and support open standards needed for a manageability framework for storage networking systems, including Storage Area Networking (SAN), SAN Attached Storage (SAS), and Network Attached Storage (NAS). Our end goal is to lower TCO and increase SAN product manageability. By identify, we mean to make reuse of current best practices and industry standards from sources such as the NSIC, Open Group, DMTF, NMF, IETF, and others, in order to begin framework formation.

By define, we mean to propose new—or adapt existing—standard infrastructures to meet the needs of the SNIA manageability framework. By support, we mean to develop and promote the SNIA manageability framework within our companies and in the industry at large.

The SNMWG will endeavor to cooperate with other industry organizations that are working towards the common interest of SAN and enterprise manageability. The SNMWG will work in a coordinated and cooperative manner with other SNIA working groups.

Managing The Enterprise

Storage Network Management Working Group (SNMWG) was formed to focus on getting the industry to step up to and build standard interfaces which will provide information to do all of the Enterprise Storage Resource Management (ESRM) disciplines. As of June of 1998 this group was subdivided into smaller work groups to focus on:

1. High-end, multi-platform, intelligent storage facilities
2. Removable media, tape, virtual tape systems
3. Fibre channel management
4. Small locally attached RAID systems

We expect these groups to come up with common standards that will allow all ESRM software to compete on level ground, and create a world of ESRM-compliant devices. This will allow customers to truly choose ESRM software based on the richness of function, and it will allow them to manage all OEM devices from a single terminal in the enterprise.

Storage Resources

We have yet to define what Storage Resources are and what the ESRM disciplines are for managing them. If we want to truly manage the enterprise, then we need to recognize that although hardware resources are a little more obvious than the software resources, we need to understand both of them.

Storage Hardware Resources:

- Disk storage
- High-end storage facilities
- Small RAID devices
- SSA (Serial Storage Adapters)
- JBODs (Just a Bunch Of Disks)
- Storage area networks
- Network attached storage
- Removable media
- Virtual tape servers
- High-end automated tape libraries
- Small tape libraries
- Optical systems
- Discrete tape drives/subsystems
- Server platforms
- Fibre Channel hubs/switches/routers/bridges

This collection of storage facilities for network storage offers unique management challenges. Let's take DASD subsystems today and compare them to those of the past.

Today, all vendors provide look-a-likes of the 3880 and 3990 family of storage control devices, even though the architecture of each vendor's storage facility is totally different under the hood. With mainframe channel commands, you can issue a Read Device Characteristics command and get asset information from any vendor's box. You can issue LISTDATA commands on MVS and get the appropriate cache performance information that is totally meaningful over all vendor boxes. Furthermore, the RMF (Report Management Facility) data holds true for any vendor's device. There is a complete industry for managing these 3880/3990 clones, with contributing corporations including IBM, Computer Associates, BGS/BMC, Boole & Babbage, Sterling Software, Candle Corporation, and many others.

The storage facilities of tomorrow have processors, operating systems, and several layers of cache. In addition, they are connected to several operating-system platforms concurrently, and may be the biggest problem of all. If these high-end, multi-platform, intelligent storage facilities become the majority of storage in the field (and chances are very good that it could happen), then the storage resource management industry has a major problem.

Simple things such as RMF data, and LISTDATA become the sound of one hand clapping since they only represent the S/390 view and not the Unix, AIX, Windows NT or other platforms they are also attached to. And, if you don't have a channel attachment, then how do you get the information in the first place and how do you drill-down to the platform level to determine which application or file is pegging the storage facility?

Some software vendors are trying to support large sets of hardware vendors but they are failing miserably because every vendor box has its own unique interfaces. This causes an explosion of software because it means custom code needs to be written for every unique box. No software company can keep up with this environment. Hardware vendors are embedding their own Web server applications with BUI interfaces into their storage facilities. The customer must then learn each BUI to micromanage each vendor's device.

Some of the newer virtual tape systems may be the most difficult storage facilities to manage. They contain a processor, an operating system, storage management software, disk storage, cache, and a

complete tape library system with controllers, tape drives, and robots. They are also attached to multiple operating platforms. The disk storage inside basically acts like a "cache buffer" to the tape subsystem by emulating virtual tape drives. These virtual tape systems may soon find a different kind of clone from DASD storage vendors that doesn't even have a tape subsystem in it. These facilities will be a front end to any tape system acting very much like the virtual tape systems on the market today.

Storage Software Resources

The notion of software as a storage resource might seem a little nebulous at first but consider the amount of storage management being done on both mainframe and open systems by software such as DFSMShsm, SAMS Disk, SAMS Vantage, ADSM, ARCserve, and GEMS, just to name a few. It is not unusual to find multiple terabytes of storage being managed by products such as these. They usually are automated, and they normally run in windows throughout the day.

In that light, they are like machines grinding through the data. And like machines, they have processing failures for things like file in use during backup, log is full, workload too large for the window, etc. When they fail, it is just as severe (if not more severe) than a piece of hardware failing. For example, if DFSMShsm doesn't complete the PSM (Primary Space Management) cycle, then there may not be enough free space to run the daily corporate business workload.

In order to manage these software resources, intelligent agents need to monitor the events, errors, windows, etc. and provide the automation hooks to keep them running without failure. This is no different from monitoring the number of read/write errors on a tape head to allow the auto-mount of a cleaning cartridge.

These products also need to be tuned for performance, and capacity planning. Both of these disciplines will have a real effect on the amount and type of support hardware required. Therefore, both what-is and what-if reports are needed as much as the threshold events for automation.

ESRM Disciplines

The following management disciplines are all part of Enterprise Storage Resource Management:

- Asset management
- Capacity management
- Configuration management
- Performance management
- Availability management

- Outboard management
- Policy management

The names of these disciplines are somewhat arbitrary, and there is some overlap in the available device information as it applies to each of the disciplines. These names were chosen not to highlight the information but to focus on the customer problem being addressed. With these categories, it becomes much easier to define the discipline as it applies to the particular storage resource being managed.

Some of the storage vendors are providing software to perform parts of the above disciplines on their storage devices only. This is not what customers want. They do not have the people or the time to micro-manage every vendor's device with specialized software. The next set of sections will provide more detail about the storage resource management disciplines listed above.

Asset Management

This discipline addresses the need to discover the resources, recognize the resource, and tie it to the rest of the topology. This means that an agent could distinguish the difference between a high-end DASD storage facility, a Fibre Channel switch, high-end virtual tape server, or other resource. After discovery, it would dynamically load the latest version of an agent and call an API for asset information. It would probably contain information such as:

- Vendor/model
- Software/license/patch
- Manufacture and support
- Physical location
- Graphic images

It is also important to discover software resources such as an ADSM Version 3 server or other ESRM agents/managers.

There are many functions that could be put under this discipline such as asset discovery, asset topology, asset lease management, and software and microcode management.

Capacity Management

This set of information would vary depending on the resource being managed. For example, in large DASD storage facilities, we would need to understand multiple levels of capacity. Basically, IT departments don't ever want to run out of free space.

To do positive capacity planning, corporate resource managers need to understand the additional capacity available at both the physical and

the logical storage levels. This includes information like a box's available free space/slots, unassigned volumes, free/used space within the assigned volumes, plus some file-level detail. They also need to understand the growth capacity based on the model, or how many frames with slots for disk drawers could be added if necessary. For a Fibre Channel switch, the capacity could be expressed as a data transfer rate based on the horsepower of the device or the number of ports.

In software, necessary information might include the number of backups, backup tapes, percent utilization, and percent scratch. IT management needs answers to question such as "If I backup this application, what will it do to my network and how much back-end storage will I need to hold it?"

In mainframe environments, this technology is a mature science. In a world of open systems connected to a set of high-end, multi-platform storage facilities, it is embryonic. VTOCs (Volume Table Of Contents), and VVDSs (VSAM VTOC Data Set), provide many of the answers on S/390 platforms. In order to provide the function for the enterprise, the ESRM software must understand every flavor of operating platform, all of the platform file systems, the configuration of every vendor device and their associated interfaces, and every flavor of storage management software.

Configuration Management

Initially, it might seem virtually impossible to think about a common API, which would allow ESRM software to configure all OEM (Original Equipment Manufacturers) storage facilities. But on further investigation, there are many similarities in all storage facilities devices. Today, much of this information is kept at the host level. To allow an ESRM agent to collect this data directly, the storage facility would need to keep track of all performance counters.
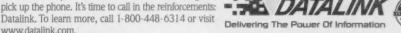
Consider the high-end DASD systems being built today. They all have cache, some with multiple layers like drawer cache. Some have NVS (non-volatile storage) for writes; others emulate this in the read cache. All have host adapters in the upper interfaces of the device. Each host adapter has a certain number of ports of various flavors, which connect to the host. All vendors have lower interfaces to the disks, called disk adapters which have a number of ports that connect to various transport types (SSA, SCSI, etc.). All have DDMs (Disk Device Modules) which usually fit into drawers and have varying amounts of raw storage capacity. There are only so many RAID types supported by vendors that can be addressed by a common API.

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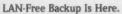
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Other notions, such as sparing, mirroring, remote copy, and instantaneous copy also have common threads that could be represented in industry-wide models. All storage facilities have the notion of logical configuration and physical configuration data, and the means to switch between them easily.

Fibre Channel configurations, have topology connectivity management for hosts, devices, and the interconnect fabric of hubs and switches. Host connectivity is through adapters, which have a certain number of ports of a certain type. Hosts feed into switches in the fabric which can either connect directly to storage adapters, to other switches, or hubs. Hubs can be cascaded to other hubs or to device adapters.

IT departments need to be able to see the current configuration and they need to understand when a physical failure occurs, and what application(s) were affected. They need to be able to set the configuration based on business requirements such as high-availability, and high accessibility. Lastly, they need to be able to do this to any OEM device through the same user interface.

Performance Management

In a world of high-end, multi-platform, intelligent subsystems, it becomes critical to do more than the standard, classical performance analysis of problem isolation with the upper or lower inter-faces, cache and NVS overload. IT managers must drill-down to the top volumes, and determine the platform, the application, and even the file causing the problem. Today this is impossible because there are no common platform-independent APIs to access standard, reliable performance information from all OEM storage facilities.

For Fibre Channel management, it may involve the management of zoning to ensure that the critical business applications get the bulk of the traffic capacity. It may also include the recognizing of trapped packets, which are stuck in the fabric but eating up the latent capacity.

Performance management of virtual tape servers might include things like monitoring the DASD buffer for hit-ratios of virtual tapes, and virtual mounts very similar to cache management in DASD storage facilities.

In software such as DFSMShsm and ADSM, it would include the ability to monitor automatic workloads such as backup or space management compared to the window they are expected to run in so that alerts can be externalized to start additional workload tasks if necessary.

Availability Management

Basically, IT departments don't want to recover. They want the ability to recover, but they simply don't want to fail in the first place. Availability management is about the prevention of failure, correction of problems as they happen, and the warning of key events long before the situation becomes critical.

For example, monitoring of the number of I/O errors on a tape head to automatically mount a cleaning cartridge is a good example of availability management. Another example would be a high availability function that upon the failure of a DASD mirrored pair would search for a spare, break the mirrored pair, re-mirror the good drive with the spare, and page the customer engineer to repair the bad drive so that the system does not go down. Indeed, one common thread in all data centers today is the fact that there are fewer people to manage the ever-growing farm of enterprise storage. Reports, graphs, and real time monitoring are useful, but only to a point. There are no people to sit in front of "GUI Glow Meters" to monitor the system. ESRM software must provide easy automation trigger events tied-in with policies and thresholds to allow the monitoring function to operate without people. There is an infinite set of automation and policy management functions that could be provided under ESRM software.

For example, if DFSMShsm is half way through the Primary Space Management window but only one-quarter of the way through the volumes, then there is a good chance that it won't complete. If PSM does not complete, then this company won't have the available free space to do their business every day. The real time monitoring would let the storage administrator see this as it was happening—if he/she were sitting in front of the screen at the time. A report or graph will let the storage administrator know this after the fact. Why not externalize a trigger event that will allow the storage administrator to put in an automation script to automatically start other Primary Space Management tasks under DFSMShsm so that it will complete?

Outboard Management

This discipline addresses the management of hardware that contains built-in data movement, and high data availability functions. There are a lot of useful, time/people-saving functions that could be provided by ESRM software.

Today, there are many data movement functions being provided by various storage vendors, especially in the high-end DASD storage facili-

ties. The data mining industry and the Y2K problem have created a huge market for data replication products such as DataReach, HDME, TimeFinder, ESP, InfoMover, InfoSpeed, FileSpeed, and SnapShot. The business continuance industry and the disaster/recovery requirements have forced outboard storage technologies for remote data copy with such functions as concurrent copy, PPRC, XRC, and SRDF.

Although these functions are powerful, they do require some user management not only for the data identification, but also the scheduling, start, stop, and error handling. Plus, the user is expected to understand the nuances of every vendor's twist on the particular data/device movement function.

Policy Management

Policy Management is probably the most nebulous ESRM discipline. The scope of policies has such a large range of possibilities. For example, imagine a simple policy, which states that if any port of a Fibre Channel switch goes down, then the appropriate person should be paged. This is fairly straightforward. As we move up the food chain in this discipline, we see more complex possibilities. How about a policy that states that you never want to run out of free space? Or, how about specifying an average of 6 milliseconds or less on every I/O against a file that has PROD as the 2nd level qualifier?

As we wander through the policy ecosystem from an IT perspective, the policy levels can get incredibly complex. Banks in the United States must have all transaction summaries complete in order to determine the M1 and M2 money supply, and other important statistics. If the daily deadline is missed, then banks are forced to pay huge fines. How about a policy which states that a bank never wants to miss this deadline?

There may not be single policies that will cover all of the ESRM disciplines. It is clear that users do want the system to manage itself as much as possible and they do want to concentrate on doing whatever is necessary to have a successful business. At a minimum, ESRM software will have to provide primitives to allow automation of basically anything that could (and should) be automated. Combinations of the primitive policies may form the actual business policies. ESRM should provide the framework for establishing those policies, for setting the controls/thresholds/auto-scripts, and for managing the storage resources based on those policy definitions, thresholds, and controls.

S-16

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ESRM Architecture

If Enterprise Storage Resource Management, ESRM, is to discover and manage storage resources so a user can manage them from anywhere in the enterprise, then there are some key architectural decisions that need to be made.

First of all, to manage all resources from a client or terminal with a common look and feel implies a BUI (Browser User Interface) running from any platform under the preferred Web browser in today's technology platform choices.

Secondly, if ESRM is to discover and manage resources from a single point, this implies that there is ESRM manager and a bunch of ESRM agents for the individual storage resources. The ESRM manager must contain services to handle user login/administration/security authorization, data base functions, logging, reporting, graphics, auto-scheduling for both data collection, and reporting, and automation events.

The whole topic of ESRM discovery agents has implications on the architecture as well. For example, how does the storage resource get found in the first place? Today, we are probably inferring TCP/IP which means that the storage resources need to have an IP server to be auto-discovered. When a storage resource is "discovered," it is important to know what type of storage resource it is so that the correct interface mechanism can be used for that class of resource. For example, the ESRM Manager would want to know if this was a high-end multi-platform intelligent storage facility, or a Fibre Channel switch, or a small tape library. This architecture would support a unique agent for each general storage resource class. Once the resource type was known, the ESRM Manager could ensure that the proper version of the particular agent type was installed on the resource in order to obtain the asset, configuration, capacity, and performance information.

If the storage resource has some data that needs to be monitored for automation triggers, then it needs to have an SNMP server for SNMP traps for automation enablement.

Not all agents will be that simple. An intelligent agent might use a long history of thousands of values before it sets off an event trigger. This says that the agent must first collect the germane information. Well, how does the agent code get to the storage resource in this case? What operating platforms are supported? The only reasonable answer to this is to have ESRM agents become Java applications that only require a JVM (Java Virtual Machine) on the storage resource. This doesn't eat up a lot of storage or computing resource.

This brings up another point. Many of the storage resources will not want these ESRM agents to be eating up their CPU cycles, or other resources. It's doubtful that any DASD storage vendor would want to dedicate 75% of the processing power to ESRM agents. They want nothing to inhibit the throughput of their I/O subsystems. This would be true of the server platforms as well. Imagine a bank dedicating 75% of the processing power to ESRM agents on the server that runs their ATM system!

Architecturally, this translates to the concept of thin ESRM agents that get in, get the data needed to the ESRM manager, and then get out. A mobile Java agent (or agglet as it is called) running under a JVM fits the bill.

Lastly, where is the data being stored and what does the database look like? The obvious answers here are that the ESRM manager platform keeps an inventory of this information in an industry accepted relational database.

All in all, this is a pretty aggressive set of functions for any software vendor to take on. What is the tie-in to existing systems-management platforms?

Systems Management Tie-in

There is a set of functions described in this article that relate very closely with existing systems management software (e.g., Tivoli, CA-Unicenter, and HP OpenView). Why not just use one of them?

There are a number of interesting points here that ESRM development corporations will have to address. First of all, there are multiple terabyte users that have no systems management software. This, of course, could change in the future.

Secondly, if a user chooses one of the existing systems management software vendors, this is not a light decision at all in terms of cost, time, and people. They probably won't switch in the near future.

A third point of consideration is the amount of traffic that would be sent up to a systems management console. Imagine every message from software like DFSMShsm, ADSM, SNMP/MIB (Management Information Block) traps from every storage device, every server platform coming to a single console. It could get overwhelming.

Lastly, a pragmatic consideration is the administrator of the storage resource. Usually, there is a storage administrator for products like DFSMShsm and ADSM. People are sometimes given responsibility for the tape libraries, or the DASD subsystems, as well. These people know and understand these resources. They don't usually understand how to set up systems management automation. Also, sometimes that process involves change control that needs to be scheduled at some time in the future. Storage administrators need to be empowered so instantaneous decisions can be made.

If DFSMShsm is not going to complete its backup window, then ESRM should have the function to allow the administrator to start another backup task. But every backup task eats up another tape drive. So why not empower the administrator to start up to 10 backup tasks? After that point, allow an alert to be sent to a higher-level systems management facility to make the determination if adding that 11th tape drive will impact production. This is layered systems management. It allows the user to choose local automation, systems automation, or a layered combination.

Conclusions

Given that we want to perform all of the disciplines above on all storage resources, are there any standard platform-independent interfaces that work on all OEM storage facilities? Other than the mainframe channel interfaces such as Read Device Characteristics, and LISTDATA, the answer is no.

The information that one gets today through channel interfaces from those same high-end, multi-platform, intelligent storage facilities is wonderful. The engineers of all storage manufacturers really bent over backward to preserve the concept of 3880/3990 performance model to allow incredibly accurate classical performance analysis for cache, NVS, upper interfaces, lower interfaces, and volumes, when connected to a mainframe only environment. We need to extend this wonderful information to the open systems world through an IP connection. We need to allow easier management of storage resources by not only providing the API but also by specifying a recommended underlying architecture and standards. To support large SAN configurations with all the high availability, reliability and security expected by today's Enterprise IT centers will require considerable cooperation and coordination amongst vendors in the storage industry. ∎

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File System Working Group

CHARTER:

To define and promote standards that will insure the rapid adoption of vendor-neutral heterogeneous shared-storage for storage area networks (SANs.) Our group will propose enhancements to these standards that will:

1. Enable them to achieve their potential maximum transfer rates in SANs over media like Fibre Channel (FC).

2. Interoperate seamlessly with TCP/IP-based network-attached-storage networking.

3. Keep the modifications to the standard protocols to a minimum to make their adoption by existing vendors as easy as possible.

Storage Networking Problem Area

Sharing storage heterogeneously over SANs is fundamentally difficult. Algorithms to coordinate access to the disk are difficult to implement, and have many practical obstacles to achieve standardization, which is a prerequisite for interoperability. In addition, disk formats vary widely from one operating system and hardware platform to another. Standardizing on one common format is commercially impractical; teaching every client how to deal with every common format is practically infeasible; limiting file system technology to one common format is unnecessarily regressive for it would forever halt the progress of innovation in new, more efficient or more useful formats.

Proposed Solution

The File System Working Group proposes a solution for sharing data heterogeneously over SANs. It is based upon two fundamental strategies:

1. To overcome the difficulty of standardizing the algorithms required to coordinate shared access to disks, we propose using and extending existing, commonly accepted Network-Attached Storage (NAS) standards for SANs.

2. Since on-disk format incompatibility is really an issue of metadata incompatibility—not data incompatibility—we propose using a common server to interpret the metadata for *all* clients, while allowing each client to access the data directly from the SAN-attached disk.

Using extended NAS protocols to share data over SANs effectively eliminates the distinction between NAS and SANs, allowing them to be managed and administered as one logical network that simply has varying means of physical connectivity. In both cases, storage is attached to, and heterogeneously shared via, some kind of network—typically, Ethernet for LAN-attached storage and Fibre Channel for SAN-attached storage.

NAS Protocol Extensions For NAS And SAN Data Sharing

The File System Working Group (FSWG) has been specifically formed to provide recommendations to extend the CIFS and NFS protocols in order to facilitate NAS and SAN integration. The objectives for the protocol extensions are as follows:

- Create an architecture that combines the NAS' ability to share file system data—cross-platform—with the SAN's ability to share storage via high-speed, direct disk access.
- Design an "open" model that facilitates multi-vendor interoperability of combined NAS/SAN solutions.

- Define minimal protocol extension requirements to ease implementation and industry acceptance.
- Facilitate rapid acceptance, adoption and proliferation of these extensions.

The Proposed Architecture

The architectural proposal builds upon the capabilities of a standard NAS server by allowing NAS clients to have high-speed access directly over a SAN when there is no contention. The proposed architecture divides client I/O traffic into *control traffic* that travels over traditional TCP/IP connections to a hybrid NAS/SAN server, and *data traffic*, that travels over a high-bandwidth connection such as Fibre Channel directly between the source and target such as an application server and a disk array.

Control functions in the NAS/SAN server provide all the functions necessary for heterogeneous file sharing not provided in SAN architectures, i.e., metadata coordination, access permission and traffic management. Once the NAS/SAN server grants access, clients perform direct disk reads and writes via standard, block-level SAN protocols. By relegating only control operations to the NAS/SAN server, network clients are able to perform the majority of data access and transfer activities via high-speed SAN.

FSWG Proposed Protocol Extensions and Adaptability to CIFS and NFS

Required File Sharing Protocol Extensions	CIFS Protocol Adaptability	NFSv4 Protocol Adaptability
Soft lock, a new form of file and record locking that is automatically withdrawn when there is contention for the same file by another client. The hybrid NAS/SAN server's traffic management capabilities resolve contention using standard NAS protocol methodology. Depending on whether the file operations are READ or WRITE functions, soft locks are either SHARED or EXCLUSIVE.	Already supported via CIFS opportunistic locks.	Extension needed. Appears similar to NFSv4's proposed lease-based locking protocols.
NAS/SAN server buffer disabling capability, to insure that all NAS/SAN server-controlled data is sent to the disk before granting the client's request for direct disk access to the same file. Also invalidates hybrid NAS/SAN server requests for the same file before any disk writes are issued by a client.	Available via CIFS NO_BUFFERING open-time flag.	Extension needed via NFSv4's proposed extended attributes function.
Storage pre-allocation capability, to pre-allocate disk blocks to a file and read the current pre-allocated size of a file. This low-bandwidth, meta-data operation mechanism allows clients to modify and add new data beyond the file's current end-of-file marker, independently of the NAS/SAN server.	Available via CIFS pre-allocation functions.	Extension needed via NFSv4's proposed extended attributes function.
Independent and explicit meta-data modification capability, to update a hybrid NAS/SAN server with a file's meta-data, after direct disk operations are completed and without disturbing the contents of allocated disk blocks.	Already supported.	Extension needed via NFSv4's proposed extended attributes function.
Extent list capability, to report to a client that disk blocks are currently allocated to a file, in file offset order, so the client can assume responsibility for transferring data directly to and from the disk.	Extension needed.	Extension needed via NFSv4's proposed extended attributes function.

The protocol is independent of hardware configuration. Methods to partition traffic physically can include separate, parallel networks or combined networks. Similarly, NAS/SAN servers and SAN disk arrays can be either different or integrated systems that can logically function as distinct devices.

In the case of contention (where multiple clients want access to the same data), the protocol automatically shifts access to the NAS/SAN server. Both clients can then have shared access privileges via traditional NAS file-sharing functions over TCP/IP.

Proprietary implementations of similar hybrid NAS/SAN architectures exist today. These support non-standard client connection protocols that limit customers to the platforms supported by that vendor.

The Open Model

The FSWG's approach will be vendor-neutral by proposing extensions to existing, open file-sharing protocols such as Microsoft's CIFS for NT/Windows2000 and NFS for Unix file sharing. These protocols inherently provide interoperability between clients and NAS products and can be easily enhanced to support heterogeneous file sharing within SAN markets. Clients that do not run the SAN-enhanced version of the NAS protocols can still access the data using any existing NAS protocol, albeit at the slower TCP/IP speeds.

The Protocol Extension Requirements

The five protocol extension recommendations currently under specification development by FSWG are defined in the Table, which also includes information about each extension's adaptability to CIFS and NFS.

The Standardization Process

NAS protocols are a successful model for sharing storage heterogeneously over networks and enabling vendor interoperability. Implementing the minor enhancements to NAS protocols that the FSWG recommends will allow network clients to directly transfer data to SAN-attached disks. Adapting existing NAS protocols to the SAN environment will realize, far earlier than industry projections would indicate, the industry's goal of cross-platform data sharing over high-speed, Fibre Channel networks. ■

SETTING THE PACE OF INDUSTRY

DISK RESOURCE MANAGEMENT WORKGROUP

CHARTER:

The Disk Resource Management group (DRMG) was created to focus on standard APIs for the high-end disk intelligent storage facilities to support the Enterprise Storage Resource Management (ESRM) disciplines such as:

- Asset Management
- Capacity Management
- Availability Management
- Performance Management
- Configuration Management
- Outboard Management
- Policy Management

Storage Networking Problem Area

Today, there are major initiatives to re-centralize the enterprise. Many of the large IT departments have well-managed centralized storage on the S/390 platforms. Yet, these same customers have thousands of servers spread throughout their enterprise that they can't even locate, let alone manage. Hundreds of recent storage studies have shown that there is a direct correspondence between the number of islands of storage and the cost of running that type of environment. The more islands of storage, the more space failures, the more performance problems, and the more people it takes to manage it.

High-end storage vendors are responding to this need by building very large capacity intelligent storage facilities which can connect to multiple OS platforms that are practically impossible to manage because each server or host only sees the view of the storage belonging to itself. Hardware vendors are providing software to respond to this problem but the software is vendor-centric which causes purchasers to buy specialized software for each vendor and to micromanage each vendor's device, costing them time and money they don't really have. IT departments want to move to Storage Area Networks (SANs) because they dramatically reduce the enterprise management costs while offering the promise of offloading routine storage management tasks without the drain of both CPU and people resources. The number one issue in implementing SANs is the ability to perform storage resource "discovery." Close behind it is the issue of being able to manage storage facilities connected to multiple operating systems—without this it will be impossible to get to true SAN management.
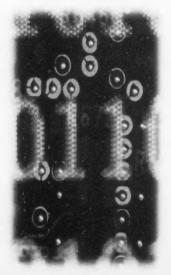
Proposed Method(s) Of Solution

Phase 1:

1. Get storage vendors to agree on building a common model and standard APIs for access to the information.

2. Create a white paper that defines the problem and the scope of the customer requirements.

3. Define a common management information model with the focus on commonality wherever possible.

4. Start with read-only information in the model; move to more complex areas (e.g., performance management and configuration management) in a later phase.

5. Influence standards bodies to define standard protocol interfaces to the common information model.

Phase 2:

1. Build a common prototype reference implementation to achieve the following:

   - Validate the informational field content of the model.
   - Verify the ability to access common information regardless of vendor.

- Document a guide for vendors to write "providers" to instantiate the information in the common model.
- Document a guide for ESRM software vendors to access information from the common model.
- Ascertain the performance and scalability aspects of the model and the access to it.
- Demonstrate to users the vendor's intent to work towards a common information model solution.
- Determine the necessary structures for continued definition of the model and the set of services/APIs necessary to perform the set of ESRM disciplines.

2. Develop a set of common code to enable all storage vendors from all SNMWG sub-groups to participate in the prototype implementation.

3. Document the methodology for building storage "providers" based on the prototype experience.

4. Generate a document to describe how to access the common model for ESRM application software.

Phase 3:

1. Update the model based on problems discovered with the prototype.
2. Define and model the remaining information content especially for the disciplines of capacity management, configuration management, and performance management.
3. Update the prototype as necessary to validate the additional model information.
4. Develop a set of requirements for storage resource "discovery." Possibly, add some technology to the prototype effort to try out some potential solutions.
5. Develop a plan for the information content and the APIs/services for SAN availability management with a high focus on automation enablement.

Phase 4:

1. Complete the remaining model definition, services, APIs, documentation as defined by Phase 3 above. ■

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BUSINESS Q&A

SHERITA T. CEASAR: "I decided what I wanted to do. I believe I get to create it"

A Champion of Women in IT

President of the Society of Women Engineers, Sherita T. Ceasar was recently inducted into the Women in Technology International Hall of Fame for her achievements in engineering as well as for championing women and minorities in technology. An enthusiastic mentor of women, Ceasar says they can achieve extraordinary results in information technology by using their personal strengths, learning from others and staying focused. She talked about that with Computerworld's **Kathleen Melymuka** *from her Atlanta office.*

Do you agree that there is a glass ceiling for women in IT? Yes. That's starting to change, but management tends to only look around the table. They don't take the posture of developing women as senior executives. That takes some investment. It needs to start early and not just when you're looking around and saying "Who can run this next business?"

Is there anything about the technical environment that women can use to their advantage? Men tend to be professors; women take it home. I see a tendency for men to talk strictly about the design of technology. When you have to explain the implications of technology, women tend to do a better job. I've seen men stand up and bore a crowd to tears, and then women come in and tell how it's going to change your life.

How do women become better valued in technology jobs? You can't forget that you're in business for profits and results. Those that have the ability to get

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WHO IS SHE?

Growing up in the projects of Chicago, **Sherita T. Ceasar** learned early to take control of her destiny. It showed as she became the highest-ranking black woman in her division at Motorola Inc. before moving to Scientific-Atlanta Inc., where she is vice president of digital launch deployment.

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extraordinary results and create a culture and a growing workforce and empower them — those are the ones who are sought after. It's not the ones who are burning out and killing their people [with work]. Women emulating the management styles of men tend to fail.

What do you mean by men's management styles? Managing by authority and from a position of power. That is a style of use and abuse. When you burn

out engineers because you have to [stay] on schedule instead of thinking of policies to make work more efficient, you will lose the game eventually.

And the opposite style is natural for women? I think it's in our nature. It may be sexist to say, but we do have the ability to nurture and enable and empower our people. When you resort to your natural instincts, they carry you a long way.

You tell women that when they start a job, they need to talk with their supervisors about their goals. Can you tell me about that? You have to have continued conversation about where you want to go. I've outlined a 10-year [career] look that says I want my boss's job. We come together at least once a year and say, "What will it take to make that happen?" You have to make sure people know where you want to go and what experience you think you need to get there. If you're waiting for someone to tell you, you won't have those opportunities.

So you've had a conscious strategy for advancing your career? Through most of my life. I decided what I wanted to do. I believe I get to create it.

Some people say that women in technology advance more slowly because they don't change jobs as often as men. Why do you think that is? I think that's a personal choice. My radar screen tells me I've got about two years on a job. For the first six months I'm challenged, learning, making changes. Then I start opening my field of vision, putting things in my tool kit to get where I want to go. In a year and a half, I'm getting antsy.

You are known for mentoring young women. Who have been your own mentors? The most impactful has been Bobbie [Roberta W.] Gutman, [vice president and director of human resources diversity worldwide] at Motorola.

What did she teach you? Mostly about corporate politics: having the opportunity to position myself with the executives; getting me the exposure; helping to coach me on how to be a leader in the organization. That involved a lot of after-work cocktails. She comes to mind because I recall a moment when I was looking at leaving after a year, and I called her because she was the highest-ranking black female. I stayed nine years.

What should a woman look for in a mentor? Look for someone who's doing it right and getting rewards and results. You don't want an individual contributor who's off to the side. Look for their achievement and how they're viewed in the company. Someone people will listen to.

What else do women in IT need to know about career advancement? If you sit in an office all day and never go out and talk about business and what's new and get engaged and let people know what your interests are, your name won't be on anyone's list for the opportunities. Make a point of having those discussions with the people who can make decisions about careers and opportunities and growth. It doesn't have to be formal. You can use airplane time with senior management. But that dialogue has to occur for people to know what you want to do. I can't over-emphasize results. ▶

KATHLEEN MELYMUKA/MS. MIS

WITI takes its sense of community to Web

THE ANNUAL East Coast conference of Women in Technology International (WITI) takes place in Boston next week. If you've been to a lot of tech conferences, believe me, this is a different animal. WITI is a nonprofit organization that for the past decade has been building a women's community in the sometimes lonely world of IT. It also has a for-profit division, WITI Inc., which owns publications, holds conferences and performs other for-profit activities. WITI is an organization with a "let's all pitch in and get this done" attitude, and nowhere is that more evident than in its conferences.

WITI conferences are designed to nurture a feeling of collaboration. The rooms are small; the seating, informal; the talk, personal. WITI doesn't want attendees; it wants participants. Its speakers tend to shun podiums and pronouncements; they'd rather sit on panels, throwing ideas out and pulling responses back. They make it clear again and again that the success of any session is utterly dependent on what the group — they're not allowed to be an "audience" — is willing to share.

All speakers also sign on as mentors who are available to talk, listen and help during the conference and — more important — after.

If all this seems a tad touchy-feely, I have to admit, that was my initial take on it, too. On first exposure to a WITI conference, I was uneasy about how different it was from other meetings I had attended. It was almost too personal, and I perceived that difference as a certain lack of professionalism.

Two things changed my mind. A few weeks after my first WITI conference, I attended one of the premiere IT conferences on the East Coast, where I was treated to the opposite extreme. Session after session took place in cavernous ballrooms twice the size of St. Peter's Basilica, and with atmospheres far more reverent. For those too far back in the dark recesses to even glimpse the presenters, huge screens showed us more than we ever cared to know. Between sessions, sound systems blared rock music to remind us all how hip we were.

It felt a lot like being at the movies. In fact, many of the presenters were so pompous, their pronouncements so ponderous, that I began to feel like Dorothy, the small and meek, trembling before the projected image of Oz, the great and powerful.

I found myself drawn to the one session each day that was relatively small and interactive. It was given so little prominence that you had to miss lunch to attend, but attendees were invited to share experiences. I enjoyed those meetings and learned a lot.

That's when it dawned on me that little old low-key, interactive WITI had it right — at least, for my way of learning.

This notion was reinforced throughout the year when, while dealing with an IT issue, I'd find myself recalling not just a pertinent fact or statistic, but whole anecdotes and personalities from the WITI conference. Ultimately, for me, the difference between the conferences — and their lasting effects — was the difference between participating and watching.

It will be interesting to see whether WITI can translate this experience to the Web when it unveils WITI.com at next week's conference. (Unlike WITI.org, the nonprofit site, WITI.com will try to generate revenue.)

A preliminary version of the site was previewed at WITI's June West Coast conference, but the new version will be beefed up significantly. The site differs from the others trying to separate women from their dollars in that WITI offers something special in return. "We'll provide access to relevant information and also access to people," says WITI.com acting CEO Karan Eriksson.

WITI.com will attempt to bring the women's technology community together in one place. "One of the key initiatives for us is to take the WITI mentoring concept and bring that into our Web communities," Eriksson says. Users will be able to talk with venture capitalists, chief financial officers, marketing people — "all the resources we have today, in far-flung directories," she explains. "We'll link those to get things done."

Getting things done is what WITI is about, and right now it's providing the framework on which to finally build a real new-girl network. The rest is up to women in technology.

So far, the site is still very much under construction, and getting a rich Web community in place requires not only that people use the experts and mentors it provides, but also that people volunteer to be those experts and mentors.

WITI.com will have something for everyone, but it needs people who are willing to share, rather than just watch. "If you're simply a seeker and taker-awayer, there will be lots of stuff online after our September conference," Eriksson says. "But if you're a WITI kind of person, get involved." ▶

KATHLEEN MELYMUKA is *Computerworld's* senior editor, management. Contact her at kathleen_melymuka@computerworld.com.

CONFERENCES

DCI'S DATA WAREHOUSE WORLD
■ Hynes Convention Center, Boston; Oct. 25-27
■ Learn how to use data warehouse investments for customer relationship management, ERP and e-commerce.
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Contact: Comtek International, in Wilton, Conn., (800) 777-8774 or (203) 834-1122; fax: (203) 762-0773; e-mail: speechtek@comtekexpo.com
www.speechtek.com.

MEASURING THE FUTURE: GLOBAL STANDARDS FOR VALUE CREATION IN THE CONNECTED ECONOMY
■ Ernst & Young Center for Business Innovation, Cambridge, Mass.; Oct. 27-29
■ Examines the different factors that can create value in today's global, technologically driven economy.
■ Cost: $1,500

Contact: Erin McDonough at Ernst & Young Center for Business Innovation, (617) 761-4066; e-mail: erin.mcdonough@ey.com
www.businessinnovation.ey.com/whatsnew/pm/pm.html

TECHLEARN '99: LEARNING IN THE DIGITAL AGE
■ Walt Disney World, Orlando; Oct. 31-Nov. 3
■ For IT and computer training managers. Learn the modern ways of delivering IT training throughout the organization.
■ Cost: $885-$985
Contact: The Masie Center, (800) 986-2743
www.techlearn.com

XPLOR (20TH GLOBAL ELECTRONIC DOCUMENT SYSTEMS CONFERENCE & EXHIBIT)
■ Los Angeles Convention Center; Oct. 31-Nov. 5

■ Focuses on the business and technology issues surrounding digital documents, from creation to delivery.
■ Cost: $1,100 by Oct. 22, $1,200 thereafter
Contact: XPLOR International, (800) 926-3976 or (310) 459-0600; fax: (310) 459-0605
www.vipmeetings.com

NEXT-GENERATION NETWORKS
■ Crystal Gateway Marriott, Washington; Nov. 1-5
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Contact: BCR Enterprises Inc., (800) 227-1234 or (630) 986-1432; fax: (630) 323-5324; e-mail: registration@bcr.com
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LISA '99 (13TH SYSTEMS ADMINISTRATION CONFERENCE)
■ Washington State Convention & Trade Center, Seattle; Nov. 7-12
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■ Cost: Varies
Contact: USENIX Conference Office, (949) 588-8649; fax: (949) 588-9706; e-mail: conference@usenix.org
www.usenix.org/events/lisa99

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ARE WE HAVING FUN YET?

Retention programs are all the rage. But how can you tell when your attempts to keep employees happy are really working? By Jeff Zbar

AN DEAKIN peers out across the IT department at Harcourt Inc.'s science and technology division and sees a fairly contented group.

During the day, projects are being finished on time and on budget. And Deakin sees and hears of camaraderie among information technology staffers and user groups, both those in the local San Diego offices and those in other offices nationwide. After hours, IT staffers and users often gather at Hollywood Star, a local bar that once was solely the haunt of the IT department.

This is a dramatic change from the situation two years ago, when IT shunned the company holiday party and the watering hole was perceived as off-limits to everyone but IT, recalls Deakin, the vice president of the divisional information office.

What changed? Fun was instilled in the workplace, Deakin says.

Fun? Consider the following: The department has instituted the "Get a Grip" award — a trophy built of vice grips perched on a Lucite stand that peers award to workers whom they feel need to be made fun of for "freaking out over a trivial problem," notes one staffer. IT staffers also have a rooftop retreat on top of Harcourt's 22-floor San Diego office tower — off-limits to all but the 15 workers in the department — where they can get away momentarily from the stress of the workplace.

In a tight labor market, these stress-busting practices help Harcourt hire and retain good workers. The department has lost only two workers in five years, Deakin says. Management keeps staff motivated and unifies a department that handles corporate Web services and supports 500 desktops worldwide, Deakin says.

How IT staffers react to issues of the day — and how management helps them cope — can determine whether an organization is seen as a desirable place to work. Programs designed to inject fun into the workplace can help relieve stress and pressure and help organizations keep staff production high and turnover low.

Gauging Success

Companies can tell if their programs are successful by tallying turnover, employee performance and even new-employee referrals, says John Putzier, president of FirStep Inc., a Prospect, Pa.-based management consultancy for the IT community, and president of the Society for Human Resource Management's High-Tech Net division, which focuses on human resources in high-tech companies.

Setting up formal programs helps build camaraderie among workers and can help a company or department gauge results, contends Putzier, author of *101 Weird Ideas for Fun and Profit: Cheap, Easy Ways to Make Life Better for Your Employees, Your Customers and Yourself*. It's important to gauge employees' ongoing reactions to the "fun" programs the company has implemented as a way to determine what's delivering the desired results, he says.

Developing a good work environment should involve building camaraderie among workers, rewarding extra work and alleviating the pressure of IT's high-stress environment. Companies with a strong corporate culture and work ethic can implement initiatives without fear of workers taking advantage of the relaxed atmosphere, experts say. In fact, Deakin's best barometer of whether his fun workplace is successful is his workers' willingness to approach him with both new ideas and complaints. "If you get a more fun workplace, you're going to have more open lines of communications," he says.

With casual attire, an open-door policy for managers and an $8 million activity center on its Dodgeville, Wis., campus, Lands' End Inc. has been recognized as a top IT place to work. Add to those policies dozens of IT morale-boosting efforts, including barbecues where managers do all the cooking; service projects through which managers reward staffers with car washings or other chores; bimonthly $1,000 drawings for staffers who worked on-call in the previous months; and bonfires to retire and burn old technology. The company has minimized turnover among more than 220 IT staffers, says Phil DeKok, IT training and recruitment manager at Lands' End.

"The one overriding principle is it's almost impossible to reward or recognize people too often," he says.

The ideas come from within, and it's up to the 12 IT managers to decide how to jump-start employee morale programs, he says. DeKok and his 11 fellow department managers look for programs that help draw managers and rank-and-file employees closer — like service projects and barbecues — and take people out of the workplace and into social settings, he says.

How does DeKok know fun initiatives are working? Though actual measurement is difficult, DeKok reports that employee turnover is low, that IT support staffers interact well with users and that the company has no problem recruiting workers to its remote Wisconsin location. When an IT organization is doing something right, word spreads — and that helps the company attract new staffers, DeKok says. ▶

Zbar is a freelance writer in Coral Springs, Fla. He can be reached at jeff@goinsoho.com.

Tips for Making the Workplace Fun

Making the workplace fun is an ideal way to foster camaraderie and overcome challenges, experts say. But they also advise organizations to limit the number of days each month they hold fun events to ensure that distinctions are drawn between occasional fun and playtime run amok. The following are a few ideas you can adopt for your own morale-boosting programs. Also consider using such events to reward hard work or successful completion of projects.

■ **Galloping Gourmets.** Companies with their own food-service departments can provide a take-home meal service for employees who work late or odd hours.

■ **The Humor Room.** Find a room with a door that closes and fill it with games, playing cards, toys, trinkets and gags like noisemakers and squirt guns to foster play among staffers.

■ **Food for Thought.** Hold a brown-bag lunch learning program where an instructor, guest speaker or employee with a unique skill can teach the staff something unusual or out of the ordinary, like self-protection or comic presentations.

■ **Dress-Up Days.** Create a day for themed dress-up, like a favorite movie cast or sports team.

■ **Oh, Baby.** Have the staff bring in baby pictures of themselves and post them on a wall. Then have a contest to guess who's who.

■ **One-Minute Parades.** Have the staff dress in their tackiest best and parade through the offices. Then vote on the winners.

■ **Hit a Flick.** If a movie or concert comes to town and enough staffers would like to go, charter a bus or van and go as a group. Tack on dinner or a post-event evening out to maximize the fun.

■ **Get Out and Do Something.** Gather the staff for an off-site event, like a day of sports at a local park.

■ **Recruiting Events.** Introduce recruits to this playful atmosphere and have staffers take them out on the town for a meal, party or extreme games. Aside from a fun experience, the team and recruit will get a better feeling for one another's personalities.

– Jeff Zbar

Flow Manufacturing Projects Set to Go Live

Upcoming installations will put software through real-world paces

BY CRAIG STEDMAN

THERE ARE STILL very few users of packaged software that was designed to support flow manufacturing techniques. But several manufacturers that have been working on flow projects for more than a year are finally getting ready to go live. with the software

Some said they will start by using the new applications in just a subset of their manufacturing operations. Full rollouts may not be finished until late next year or early 2001, as users try to balance the complexity of installing new manufacturing systems and retooling their assembly lines for flow production, which involves making goods only as orders come in (see Quick-Study, page 73).

But the upcoming installations will increase the real-world tests the software is getting. Oracle Corp. and Atlanta-based American Software Inc. — the principal vendors of flow manufacturing packages during the past 18 months — said they have a combined total of only a dozen active users.

For example, NACCO Materials Handling Group Inc., a $1.7 billion maker of forklifts in Portland, Ore., is testing American Software's flow module at a plant in Northern Ireland and expects to go live with the software at four more sites by year's end.

Old Meets New

Flow lines require specialized software because they replace traditional approaches to work orders, materials management and manufacturing planning with simple schedules based on actual orders and a continuous supply of parts and raw materials — functions that traditional manufacturing packages are ill-equipped to handle, said Sal Tramaglini, CIO at NACCO. "You can't

CLEVELAND MOTION CONTROLS' Jeff Pecon says flow lines cut his company's typical manufacturing cycle from a month to two weeks

support a flow manufacturing environment with [conventional enterprise resource planning (ERP)] software," he said. "It just doesn't fit."

NACCO plans to finish converting all 10 of its U.S. and European plants to flow lines this year. The company had to write homegrown code to manage its production lines while waiting for American Software to deliver an upgrade that could handle all the configuration options offered on its forklifts, Tramaglini said.

That version finally arrived in the spring, but it will likely be the first quarter of 2001 before the flow software is installed at all the plants, Tramaglini said.

American Saw and Manufacturing Co., a maker of saw blades and hand tools in East Longmeadow, Mass., plans to go live in November with Oracle's flow manufacturing module and companion ERP applications for jobs such as order entry and purchasing.

Jim Holston, a manufacturing manager who's leading the

flow rollout team, said American Saw hopes to quickly start running its entire plant with the software, even though the facility won't be fully converted to flow lines for another 16 to 18 months.

American Saw wants to turn off its current manufacturing software without having to configure the new system to support the traditional production techniques that are being

phased out, Holston said.

So the company plans to start off by doing "flow in place," he said. Products will still be built piece-by-piece in separate departments, but the Oracle software will manage the process as if it were being done on integrated lines in which products flow smoothly from one station to another.

Cleveland Motion Controls Inc., a maker of devices that control industrial motors, also plans to go live with Oracle's flow module in a portion of its main plant by year's end.

Some flow lines have already been set up, and the switch has helped cut typical manufacturing cycles from a month to two weeks, said Jeff Pecon, vice president of the Cleveland company's controls and systems product group. He said he expects to do even better once the software automates management procedures now done by hand.

But Cleveland won't have the flow software fully installed in its two other plants until next summer. Before doing that, the company has to finish a rollout of the core financial and order-entry applications in Oracle's ERP suite. Trying to roll out flow software at the main plant and the secondary plants while bringing the ERP suite online would be too much, Pecon said.

"It's a matter of bringing the technology online in some

kind of reasonably sane way while continuing to run the business," he said. "We don't want to send shock waves throughout the company." ▶

E-Business Not Booming Yet

BY LUISA BUSTOS
SYDNEY

Many businesses lack effective e-commerce strategies and are still in the early stages of electronic-business deployment, according to U.S. research by Meta Group Inc.

Meta claims electronic business deployment among users is still in "wait-and-see" mode despite the hype surrounding Web-enabled enterprises.

"E-business has not yet be-

come part of a larger corporate culture and strategy," said Kirk Reiss, senior vice president of Meta Group Consulting. "The low dollar investment in e-business is indicative of stopgap measures and patch-up thinking — a 'me-too' strategy where companies are doing e-business because they see that others in their industry are."

For Hemant Kogekar, information technology director at Franklins, a division of Asia-

Pacific retail food conglomeration Dairy Farm, the wait-and-see approach has been the best way to approach business-to-consumer e-commerce.

Franklins has been developing business-to-business e-commerce links with between 10 and 20 suppliers but is going slowly and keeping costs low on the effort, he said.

"Educating suppliers seems to be a bigger part of our effort than the technology. This is the reason it as taken so long [to adopt]," he said. ▶

Bustos writes for Network World Today *in Australia.*

Flow Manufacturing

BY CRAIG STEDMAN

IN TRADITIONAL manufacturing plants, different pieces of the production process are done in separate departments, which each try to maximize their own output. Subassemblies and finished goods get built and then sit in inventory while companies wait for orders to materialize.

Demand-based flow manufacturing, on the other hand, takes companies in a very different direction. It does away with stand-alone departments and reduces or even eliminates costly product inventories.

The flow approach is a form of build-to-order manufacturing — a wider category in which production is typically scheduled only as orders are received from customers.

Flow isn't new, having evolved in the 1980s out of so-called "flexible manufacturing" concepts such as just-in-time delivery of components and materials.

But it's starting to attract more attention from manufacturers, in part because software vendors such as Oracle Corp. and Pleasanton, Calif.-based PeopleSoft Inc. have started releasing packaged applications for managing flow systems (see related story, page 72).

A Fluid Process

In plants using flow techniques, products are built from start to finish on an integrated manufacturing line. Work is carefully sequenced so the products "flow" steadily down the line, with each step taking the same amount of time.

Materials and parts are stocked where they're needed along the line, and plant-floor workers are trained to handle several assembly jobs so they can move around to help out where bottlenecks occur — sometimes even on a different line. Products are inspected at each workstation, in an attempt to catch defects as they happen.

The result, users and analysts say, can be sharp reductions in inventory costs, faster manufacturing turnaround times, fewer faulty products and less floor space for production.

David Monroe, an analyst at Plant-Wide Research Group in North Billerica, Mass., says inventory savings of 50% or more are typical on flow lines compared with traditional manufacturing methods. And savings in the range of 80%

DEFINITION

Flow manufacturing is a method of manufacturing in which products are made only as orders are received. To eliminate bottlenecks, flow-based production lines are designed so that each step in the manufacturing process takes roughly the same amount of time. Potential benefits include lower inventory costs and fewer defective products.

Eaton Corp., a $6.6 billion conglomerate with more than 100 manufacturing plants, began using flow manufacturing techniques six years ago. Tom Varacky, a senior business systems consultant at the Cleveland-based company's information technology department, talked with *Computerworld* about the business benefits and challenges of the flow approach.

Q. How widely has Eaton adopted flow manufacturing?

A. It's really the preferred method of manufacturing at a corporate level. As a methodology, it's probably implemented in at least 50% of our plants.

Q. What kind of benefits are you getting by using flow techniques?

A. The biggest one is that it eliminates waste, which really translates into lower inventories and less movement of [production] materials. There are some plants that have reduced their inventory costs by as much as 80%. It also lets you catch [product defects] right away. You don't build a whole batch of things and then realize that they're all defective.

Q. How much do you have to redesign plants that are switching to flow-based production lines?

A. That really varies. Our goal is to not move any more equipment than we have to, and we also don't want to buy new [production machines]. But if we have a plant that's doing extremely traditional manufacturing, there's quite a bit of equipment relocation that has to take place.

Q. How big of a change is it for workers in the plants?

A. You only make parts when you need parts, and that makes people a little nervous. They've come into a plant and always been told to build parts, build parts, build parts. In some cases, measurements [of manufacturing effectiveness] have to be changed. We find that the people [working] on a line see the improvements and tend to accept it more quickly than the plant managers do.

tions in inventory costs, faster manufacturing turnaround times, fewer faulty products and less floor space for production.

David Monroe, an analyst at Plant-Wide Research Group in North Billerica, Mass., says inventory savings of 50% or more are typical on flow lines compared with traditional manufacturing methods. And savings in the range of 80%

aren't unheard of, he adds.

To the uninitiated, "it sounds like voodoo," acknowledges Garret Wyckoff, manager of manufacturing engineering at a Florham Park, N.J., unit of Siemens AG that makes fire-detection systems. For example, he says, switching to flow manufacturing techniques helped the plant improve its percentage of orders filled with a single

shipment, from 70% to 98%.

But implementing a flow manufacturing setup isn't a simple matter.

Jeff Pecon, vice president of the controls and systems product group at Cleveland Motion Controls Inc., says the manufacturer is "basically retooling the entire business" as part of a switch to flow production techniques.

The company's products — devices that control industrial motors — are being redesigned to use more common components that can be quickly assembled as orders come in. Plant layouts have been completely rearranged to set up the integrated flow lines, and it's outsourcing manufacture of printed circuit boards in an attempt to eliminate a potential production bottleneck.

Much time has also been

How It Works

Demand-based flow manufacturing

- Production engineers design integrated manufacturing lines
- Work is sequenced so each step takes the same amount of time
- Plant equipment is rearranged to eliminate separate departments
- Workers are trained at multiple stations to help avoid bottlenecks
- Parts and materials are stocked in bins along the production line
- Manufacturing schedules are based on actual orders, not forecasts

spent working with suppliers to make sure they can meet the daily need for raw materials. Even the sales force is being counted on to provide a more accurate picture of what customers are likely to buy so the company can be ready to react quickly to changes in demand.

"Flow is a whole business

strategy," Pecon says. "It's not just a shop-floor project." But all the setup work can pay big dividends: A pilot project at Cleveland Motion Controls helped cut manufacturing time for one product from 29 days to two and lowered the percentage of defective items from 21% to 2%.

At the heart of flow manufacturing is a belief that inventory "is the root of all evil," says Bill Swanton, an analyst at AMR Research Inc. in Boston. "The mind-set you're trying to get to here is that products just come straight off the line and go onto the loading dock."

Swanton says flow techniques work best with products that give buyers a wide choice of configuration options, such as appliances and industrial equipment.

But it can take a year or more to do a flow manufacturing makeover at a plant, from designing the new lines to retraining plant workers. Converting the Siemens plant in New Jersey to 21 flow lines took two years of planning and three years of implementation work, Wyckoff says.

American Saw & Manufacturing Co., a maker of saw blades and hand tools, plans to move more than 300 pieces of production equipment around its headquarters plant in East Longmeadow, Mass., as part of a flow manufacturing project that started last September and isn't due to be completed for another 16 to 18 months.

Plant-Wide Research estimates that fewer than 5% of manufacturers are currently doing some form of flow manufacturing. And many of the companies with flow lines in place still use more conventional manufacturing approaches to build up inventories of specialized components and subassemblies, according to Monroe. ▶

MOREONLINE

For links to resources on flow manufacturing and to other *Computerworld* articles on the topic, visit our Web site. www.computerworld.com/more

■ *Are there business terms you would like to learn about in QuickStudy? Please send your ideas to quickstudy@computerworld.com.*

"Dear Career Adviser:

I am 48, a systems analyst in the Army and about to retire. To prepare for a civilian career, I took some Web and C++ programming courses, but I feel I can't compete with someone who has grown up on the Internet and has a computer science degree. Should I get an MBA?

I'm interested in e-commerce, but I know I'm not the typical hire in this field. Who will hire me? — EX-ARMY BRAT

Dear Army:

Give yourself an "A" for your realistic appraisal of the competition in your career field. True, you may not be competitive against (young!) Web developers with fantastic computer science degrees, but with your background and mature business acumen, if you're technical and can handle lots of customer contact, you can go to the head of the class as a systems engineer in a presales or post-sales role.

First, don't target e-commerce companies focusing on entertainment or the youth market. Instead, select products and services aimed at business applications.

As a systems engineer, you'll need to know your own and competitors' applications cold and be a quick study of customer architectures to determine what works with your particular application. Technically, you must also be able to develop prototype applications on the fly and remain calm as they seem to crash unfailingly in customer demos.

You'll also need to bond tightly with the salesperson you support and his clients, travel well on frequent trips and persist through the five to six client calls and high hoop-jumping it may take to present and sell these applications and consulting services products.

"Dear Career Adviser:

I'm a self-taught webmaster currently doing my MBA in marketing and taking classes in HTML, Photoshop, Flash and Java. I'd like to get into Web marketing. With two years of Web work experience, an MBA from an average university and my only computer education in the above-mentioned courses, can I expect a good career in Web marketing or e-commerce? How do I stand with regard to the competition, and where should I go when I hit the job market? — TECHNICAL THOMAS

Dear Technical:

"Web marketing professionals are in great demand," says Wayne Steiger, president of USCreative.com, whose candidate database and partnership with Hire.com matches 350,000 Web designers and developers with thousands of job openings across the country. So implement these three steps:

First, decide the type of company you want to work for and target businesses that are aggressively looking for people with your interests.

Second, align yourself with organizations such as the American Marketing Association (www.ama.org) and visit www.coast.com/compass to find other webmaster, designer and developer organizations in your locale.

Third, focus on jobs in cities with strong high-tech communities, such as Silicon Valley; Austin, Texas; Research Triangle Park, N.C.; Boston; or Salt Lake City. "Your future looks very promising," assures Steiger, "because companies with a Web strategy need to implement their site while others are scrambling to launch a Web presence. Companies are willing to pay premiums for entry-level professionals on up."

"Dear Career Adviser:

With three years of software engineering experience in the networking arena, I was lucky to get some international exposure, which I really enjoyed. I currently work for a small development firm that has no international opportunities, but I want to live overseas for a few years. How can I find a company that will send me overseas? — INTERNATIONALLY BENT

Dear Bent:

For most overseas high-tech jobs, run searches at HotBot or AltaVista. There are also Web sites with opportunities in specific countries. Try www.jobnet. co.il for opportunities in Israel; www.germany-usa. com for Germany; or www. computerworld. com/home/ printnsf/all/ 9907268662 for Ireland. For more international job sites, visit www. computerworld.com/home/ print.nsf/all/9902088ED6.

Also contact U.S. executive search firms that specialize in this niche. You can find them through Hunt-Scanlon Corp. or Kennedy Publications executive recruiter directories in most business libraries. Just as with the U.S. H-1B visa process, you usually must acquire the right to work elsewhere legally through marriage or be sponsored by a local company, in which case your work visa could take several months to obtain and will initially cover only a one-year period. ▶

FRAN QUITTEL is an expert in high-tech careers and recruitment. Send questions to her at www.computerworld.com/ career_adviser.

BRIEFS

NSI, Commerce Dept. Extend Domain Tests

The U.S. Department of Commerce and domain name registrar Network Solutions Inc. (NSI) in Herndon, Va., have agreed to extend for a fourth time the testing phase of a competitive system for registering Internet addresses.

The test period, which was due to expire 10 days ago, has been extended to Sept. 30. The Commerce Department said the extension should provide enough time for the resolution of differences with the NSI over how the new system will operate. The responsibility of assigning domain names will be held by the NSI as well as entities such as the new Internet Corporation for Assigned Names and Numbers.

Meanwhile, 10 registrars have begun offering competing domain name registration services, including firms in France, Australia and the U.S., the statement said. Dozens more registrars have been approved to offer services once the test period is complete.

Credit-Card Firm Names First CIO

Renaissance Holdings Inc., a Portland, Ore.-based credit-card services firm, has named Jay Hemmady its first-ever CIO. Hemmady, a 21-year information technology veteran, was previously chief technology officer at Jubitz Corp., an information services provider to the trucking industry that's also based in Portland.

Former Sun Star Lands at Bank

Alan Baratz, 44, former president of software products and platforms at Sun Microsystems Inc., has joined New York investment bank E. M. Warburg Pincus & Co. Inc. as managing director of its information technology team.

Niku Teams With USi

Niku Corp. in Redwood City, Calif., has announced an agreement with USinternetworking Inc. (USi) in Annapolis, Md., to provide its professional automation services software through USi's application service provider operations. Niku's primary mode for distribution will be through USi's data centers in Annapolis, London, Tokyo and Milpitas, Calif.

Users can lease the software on a flat-fee contract basis, beginning at $5,000 per year, per seat, paid monthly. Niku's software automates professional service functions from time and expense procedures to project accounting and billing. USi will offer Niku customers around-the-clock support.

SNAPSHOT

Where Microsoft Makes its Money
Percentage of gross profits by product:

	1998	2000*
Windows	44%	42%
Desktop applications	35%	31%
BackOffice, Exchange	11%	13%
Developer products	4%	3%
Home products	3%	4%
Hardware	2%	2%
Media, other products	1%	5%

* Projected

SOURCES: EVEREN SECURITIES INC., CHICAGO; MICROSOFT CORP.; CFO MAGAZINE

Interchangeable?

For a business world that now works 24x7, the new Compaq Armada line delivers maximum flexibility and compatibility. Any new model can work with any new Docking Solution, for mix-and-match convenience. Common MultiBay devices let users share a second battery, plus DVD, CD and other drives, across multiple Armada models. Which simplifies inventory needs and lowers your total cost of ownership. In short, for just about any mobile enterprise, the versatile, flexible new Compaq Armada Series is a nonstop solution that really clicks. Details? Visit www.compaq.com/armada, or call 1-800-AT-COMPAQ.

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Armada M300 Series @ $1,999*
• 3.1 lbs, 0.9" thin • Mobile Intel® Celeron™ processor 333 MHz • 11.3" color TFT display
• 4 GB** Hard Drive • 64 MB RAM • 56K V.90 integrated modem† • Optional Mobile Expansion Unit

TECHNOLOGY

BETTING ON WIN 2K BETA 3

Is it nuts to deploy beta software on hundreds of desktops and notebooks? A Los Angeles law firm did exactly that with beta 3 of Windows 2000 Professional edition and says its systems not only survived, but are working better than ever. ▸ **78**

START-UP GIVES T1 LINES A BOOST

Using proprietary compression software, start-up Expand Networks can at least double the capacity of T1 lines. Because of its cost ($25,000 per line), the Expand approach might work best on expensive international lines. ▸ **80**

ARE THIN CLIENTS FINALLY IN?

More than two years after the initial hype, thin clients seem to be taking off. One reason: falling prices for the software and hardware needed for a thin-client system. ▸ **79**

FILE . . . OPEN . . . EDIT . . . CRACK!

It sounds like something out of *2001: A Space Odyssey*, but it's real. Crackers can use remote administration tools like NetBus and Back Orifice to remotely tap PC cameras and mikes. ▸ **80**

EXEC TECH

You pay more for less PC, but you gain more desktop space. We look at another kind of "thin" client: full-featured PCs in space-saving designs. We consider the Profile from Gateway, the Thunderbrick2 from Brick Computer and the Vaio SlimTop from Sony. ▸ **84**

SECURITY STANDARDS

We love standards — that's why there are so many of them. Now the government and software vendors are trying to come up with common standards to judge how well security software really works. ▸ **92**

J. D. EDWARDS' PORTAL PUSH

Enterprise resource planning vendor J. D. Edwards plans to jump on the portal bandwagon with an application that will let IT managers design corporate intranet portals. ▸ **78**

MIX AND MINGLE

IT organizations give kudos to user shows for their help with systems strategies, peer advice and training, according to a *CW* survey. ▸ **88**

WHERE COPPER MEETS THE ROAD

IBM gives a big speed boost to its high-end AIX servers with new copper-based chips and a switch that more than doubles data transfer rates between the CPU and memory. ▸ **79**

MANAGING ONLINE CUSTOMER CARE is a growing problem, and a growing business for start-up Aditi Corp., says CEO Pradeep Singh

HELP ARRIVES FOR ONLINE HELP

WEB-BASED CUSTOMER SERVICE. It sounds like a great idea — until hordes of customers start using it. Start-ups such as Aditi Corp. are racing to grab a piece of the exploding customer-care marketplace, with new management applications and outsourcing.

82

Law Firm Gambles, Wins On Windows 2000 Beta

CIO says firm's 420 desktops and 60 laptops perform better after upgrade

BY DAVID ORENSTEIN

A LOS ANGELES law firm gambled — and apparently has won — on an enterprisewide rollout of a beta version of Microsoft Corp.'s Windows 2000 Professional Edition.

Troop, Steuber, Pasich, Reddick & Tobey LLP this spring installed the software on its 420 desktops and 60 laptops. Though many users and analysts have a policy of avoiding Microsoft software until the first service pack, the firm jumped in even before Microsoft was willing to call Windows 2000 a shippable product.

"It sounds a bit nutty," acknowledged James Shourt, the firm's CIO. "The fact that it's a beta product was, in my mind, irrelevant because it is better than what we had."

New Life

When the firm upgraded its laptops to Windows 2000, they came back to life, Shourt said. Power management and plug-and-play configuration of PC and network cards worked well, where before there had been struggles with Windows NT 4.0 workstations.

> The fact that it's a beta product was, in my mind, irrelevant because it is better than what we had.
>
> **JAMES SHOURT, CIO, TROOP, STEUBER, PASICH, REDDICK & TOBEY LLP**

Despite the more demanding hardware requirements of Windows 2000 Professional, both the laptops and desktops at the firm performed better after the upgrade. "It may be a fluke. But for us, it worked," Shourt said.

Of the 72 applications the firm runs on its PCs, only two didn't work after the upgrade.

Meanwhile, the operating system has been very stable, Shourt said. The firm spent the month of April testing each of its machines and all the applications to ensure that Windows 2000 Beta 3 would work well, Shourt said.

Upgrade Debated

Analysts disagree on the wisdom of the firm's move. "I don't think that running Windows 2000 beta is crazy at this point — this is one of the most widely distributed betas ever — and overall feedback has been good," said Joe Clabby, an analyst at Aberdeen Group Inc. in Boston. "NT 4.0 was ugly in mobile mode."

But Dan Kusnetzky at International Data Corp. in Framingham, Mass., countered, "I generally recommend to my clients that they wait until a product is released, has been out in the field for a while and has been proven trustworthy. It certainly sounds like this organization has had good experiences. I'm not so sure that everyone would have similar experiences."

Earlier this month, analysts at Gartner Group Inc. in Stamford, Conn., estimated that most enterprises will find upgrading to Windows 2000 costly because many applications won't work (see chart).

Although Troop Steuber's upgrade wasn't painless — the company tested for a month, one application required replacement, many machines required more RAM, and 18 couldn't make the trek at all — Shourt said the costs were very reasonable.

SNAPSHOT

Microsoft in the Workplace

Which of the following Microsoft software products are in use at your company?

Office Suite (or parts of it)	98%
Internet Explorer	93%
Windows NT Server	92%
Windows 95	92%
Windows NT 4.0	92%
Exchange or Outlook	70%
BackOffice Suite (or parts of it)	71%
Windows 98	65%
Internet Information Server	42%
Windows 3.1	40%
Microsoft Network	33%
Windows CE	18%
Terminal Server	17%
Embedded Windows NT	12%
Transaction Server	11%
Project	12%

Base: Survey of 103 IT managers at companies that have 500 or more employees and use Microsoft products

SOURCE: COMPUTERWORLD IT INTELLIGENCE UNIT, FRAMINGHAM, MASS.

Windows $2,000?

Although Microsoft disagrees, Gartner Group recently estimated a huge per-desktop cost for migrating to Windows 2000 Professional

PLATFORM MOVING FROM	COST PER DESKTOP
NT Workstation 4.0	$1,250 to $2,050
Windows 9.x	$2,015 to $3,100

Assumption: Cost based on a typical 2,500-user, network-connected enterprise, where two or three applications out of 10 on the desktop need to be replaced or fixed to work with Windows 2000.

SOURCE: GARTNER GROUP INC. STAMFORD, CONN.

"If we spent $200 per machine, that would be an exaggeration," he said. ▶

MOREONLINE

For resources related to Windows 2000, such as articles and white papers, visit our Web site.

www.computerworld.com/more

J. D. Edwards Plans to Launch Portal App

ActivEra Portal will let customers build corporate intranets

BY DOUGLAS F. GRAY
PARIS

Enterprise resource planning (ERP) software manufacturer J. D. Edwards & Co. will launch an application next month that will allow customers to design Web-based corporate intranet portals, the company's CEO said here at last week's International Data Corp. European IT Forum.

The application, called ActivEra Portal, will be officially announced Sept. 21 and will launch next month, according to Douglas Massingill, president and CEO of J. D. Edwards in Denver.

These portals, Massingill explained, will give employees access to a range of internal resources, including their company's customer information, industry news, services, applications and trading communities, all from a single screen.

Eye on the Future

Massingill said ActivEra was designed to ease companies into the future, when every company will have to be open around the clock to carry out business transactions.

"The critical restraint today is time," he said. "And it will be even more critical in 2010."

Massingill said the most important technology in the next 10 years will be timesaving devices and programs, including devices that know when they're outdated and appliances such as smart refrigerators.

He also pointed out that warehouses in the future might not need employees because they would be equipped with "smart shelves." These shelves would know what's stored on them and be able to ship products automatically, Massingill said. ▶

Gray writes for the IDG News Service in London.

TECHNOLOGY HARDWARE

Thin-Client Device Shipments Soar

Lower prices, proven technology help thin clients break out of niche status

Thin Clients' Big Three

The following companies represent 78% of worldwide shipments of thin clients and 74% of worldwide revenue:

	PERCENT OF ALL SHIPMENTS	REVENUE SHARE
Wyse Technology	39%	17%
IBM	22%	28%
NCD/Tektronix	17%	29%

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

BY STACY COLLETT

THE HYPE created more than two years ago over thin-client technology may finally have some weight behind it.

Shipments of thin-client devices, the desktop workstations that rely on servers for their applications and processing power, reached 305,000 units in the first half of this year — 83% more than in the first half of last year and only 63,450 units less than in all of 1998, according to a study by International Data Corp. (IDC) in Framingham, Mass.

Partly responsible are lower hardware prices and cheaper software from Citrix Systems Inc. in Fort Lauderdale, Fla.; Mountain View, Calif.-based Network Computing Devices Inc. (NCD), which last year purchased Tektronix Inc.'s thin-client business unit; and Microsoft Corp. But the ongoing shift to server-centric computing, new opportunities for renting applications and proven technology are also changing the way end users look at thin clients, according to observers.

The core of thin-client computing — housing applications on a central server — has been growing in popularity more quickly than thin-client devices themselves, said Wolfgang Baltes, general manager at Hewlett-Packard Co.'s thin-client division.

Historically, companies have just used their existing PCs to run applications. "They wanted to keep their options open in case server-centric computing didn't live up to its promise," he said. But as PC leases run out, companies are buying thin clients.

University of Utah Hospital in Salt Lake City has been deploying billing, administrative and nursing-station applications from servers for more than three years. Today, 40% of its desktops are thin-client terminals from Wyse Technology Inc. and NCD, but its goal is to raise that amount to 80%.

"In March, all the leased PCs start going back," said Jason Traeden, senior systems analyst at the hospital. So far, Traeden hasn't found many areas where thin clients won't work, except for research groups where dedicated power and drive space are required.

Bank of Nova Scotia in Toronto is using 50 thin clients

JUST THE FACTS

Thin-Client Catalysts

- Less costly software from Citrix, Microsoft and NCD
- Hardware priced under $500, which is affordable for small businesses
- Ease of use has been proved after several years of use.

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

from Sun Microsystems Inc. to replace dual PCs on many employees' desks that ran Unix and Windows NT applications. The bank plans to convert most of its PCs to thin clients by year's end, said Gail Smith, senior vice president.

"It's definitely the desire for a certain class of users to have centralized management" that has catapulted thin-client sales, said Andy Bochman, an analyst at Aberdeen Group Inc. in Boston. "There's been a slow education going on" with both customers and vendors.

Servers have ratcheted up their performance to drive applications, new bridges and routers have lessened network performance problems and software vendors have created systems that run applications on PCs and thin clients, said Joe Clabby, another analyst at Aberdeen.

Earlier this year, NCD announced new ThinPath and ThinPath Plus software that supports both PCs and thin clients. NCD originally licensed ThinPath for $295 for five users, but in June the company announced that the product would be free.

Citrix Systems Inc. also announced an agreement with 14 thin-client manufacturers to let customers use a limited set of features without having to purchase the company's WinFrame or MetaFrame software. The software lets Microsoft applications run in an NT server environment.

Small businesses stand to gain the most from cheaper software and thin clients priced less than $500, according to Eileen O'Brien, an analyst at IDC and author of its thin-client study. ▶

MOREONLINE

For resources on thin-client computing, visit our Web site.
www.computerworld.com/more

Internal Switch, Copper Chip Pump Up IBM Unix Servers

More than doubles data transfer speeds

BY JAIKUMAR VIJAYAN

Much of the increased performance in IBM's recently introduced high-end Unix servers comes from its new copper-based chip technology and an internal switch that more than doubles data transfer speeds between the CPU and memory.

Also lending a boost is a new release of the AIX operating system that's capable of supporting up to 24 processors. The operating system features a new workload manager that allows users to consolidate and manage multiple workloads on a single server, said Jeff VerHeul, a vice president of servers at IBM.

IBM last week enhanced its Unix server lineup with new models and software aimed at enterprise and Internet applications. At the high end, the company introduced the RS/6000 S80, a 24-processor system based on IBM's 450-MHz PowerPC RS64 III copper chip.

The system, with an entry price of $290,000, comes with support for up to 64G bytes of memory, up to 45T bytes of external storage and nearly three times the raw performance of its predecessor, the Model S70A, according to IBM.

"The new servers give us the ability to scale greatly," said Hugh Hale, senior manager of information systems at Blue Cross/Blue Shield of Tennessee in Chattanooga.

The company recently installed a 12-way S80 server to accommodate a growing workload that would have pushed its existing S70 servers to capacity in about four months' time, Hale said.

"With this, I don't have to worry about headroom" for some time, he added.

Similar scalability concerns are prompting Ursus Telecom Corp. in Sunrise, Fla., to consider the new servers for hosting its Stream.com Internet telephony site, according to Jay Chavez, a vice president at the company.

IBM's use of copper technology in its PowerPC chips contributes about 10% to the overall performance gain on the new servers, said VerHeul. Because copper is a better conductor than aluminum and requires less power, the new chips are smaller and yield greater processing speed than previous ones. An 8M-byte error-checking and error-correcting cache memory integrated on each chip also adds to the performance and reliability, VerHeul said.

A high-performance "nonblocking cross-bar switch" configuration delivers 4.8G-byte data transfer speeds between each CPU and memory module — substantially greater than before.

"Think of these switches as multiple elevators going to multiple floors on a building. Previously, there was just one elevator going to multiple floors," VerHeul said.

Meanwhile, the workload manager on AIX 4.3.3 — the latest release of IBM's Unix operating system — automatically assigns system resources as workloads change, allowing users to set priorities for important applications. For instance, a Web-serving application that's running on a new RS/6000 system can be automatically assigned additional CPU resources whenever traffic to the site increases suddenly. ▶

SNAPSHOT

Handheld Growth

How likely is it that your company will use handheld computers in the next year and in the next three years?

	1 YR.	3 YRS.
Not likely	31%	9%
Neutral	30%	37%
Likely	38%	52%
Don't know	1%	2%

Base: Survey of 626 U.S. corporate companies with 500 or more employees.

SOURCE: COMPUTERWORLD IT INTELLIGENCE UNIT, FRAMINGHAM, MASS.

Big Bandwidth Boost From Expand's Software

*Savings seen on international links,
but T1 may still be a better domestic deal*

BY MATT HAMBLEN

EXPAND NETWORKS Inc., a small start-up in Murray Hill, N.J., has been wowing its customers with gear recently made available in the U.S.: proprietary software that provides a dramatic expansion in T1 bandwidth, saving Expand's customers the cost of installing new lines.

These cost savings are acute on international point-to-point connections, where a T1 can be 10 times the monthly cost of a domestic line.

For example, Internet Gold, an Internet service provider with 150,000 subscribers in Tel Aviv, doubled bandwidth for outgoing traffic on a single T1 line to New Jersey after it began using Expand's Accelerator 4000 gear a year ago, said Ofer Amsalem, the company's chief operating officer. Because of the increase in bandwidth, Internet Gold didn't need to pay for a second T1 at a cost of about $40,000 per month, saving the company nearly $500,000 last year.

And at Texas Instruments Inc. in Dallas, network engineers have been testing the Accelerator 4000 since July on a link 300 miles away and have seen bandwidth increases three times the rated limit, said Dan McGee, network analyst.

It costs $25,000 in the U.S. to install two Accelerator boxes on either end of a link, compared with $3,000 per month to lease a new T1, which means Accelerator 4000 might not be cost-effective domestically, McGee said. But Texas Instruments is evaluating Expand's product for service to Toronto, where the leased T1 would cost much more.

Global printing company Scitex Corp. has seen an increase of at least 50% in data bandwidth on a link between its Tel Aviv headquarters and Boston, said Uri Nachum, corporate telecommunications manager at Scitex. Nachum said he hopes Expand's next product will allow multipoint bandwidth expansion, not just point-to-point. Expand said it is planning such a product.

Though Expand calls the product an accelerator, analysts refer to it as a "proprietary compression scheme" unlike anything offered today by Cisco Systems Inc. or other big networking players. "They call the product 'adaptive compression,' since they peek inside protocol packets on the wire and they know this is e-mail or a Web packet. And because they know something about it, they optimize the compression for that packet," said Lance Travis, an analyst at AMR Research Inc. in Boston.

Travis said he doubts Expand's claims of a bandwidth improvement of 300% to 400%, but he added, "I'm willing to believe they get a doubling with some customers." He predicts that major network providers will be able to accomplish the same expansion in their products within nine months. ▶

A Boost for T1 Traffic

How Expand Network's Accelerator 4000 works

1 Two accelerators are placed on either end of a T1 link.

2 Expand's software tracks the type of data packets being sent and received.

3 Software compresses data, based on customization settings for various types of user traffic, and decompresses the data on the other.

4 Increases bandwidth by a factor of at least two, users say.

DEBORAH RADCLIFF

Your PC may be tapped

IF YOU'RE FINDING user-installed cameras and/or microphones on Windows NT machines in your enterprise, be afraid. For the past four months, U.S. Army special agents have been showing their commanding officers how to turn microphones and cameras into remote spying devices.

"We run this in the lab here all the time. You can hear the guys talking [from another room], but they have no idea you're listening to them," said Jeff Hormann, special agent in charge of the Computer Crime Resident Agency, U.S. Army Criminal Investigation Command, Fort Belvoir, Va.

The attack is delivered to the victim as a Trojan horse — a hostile applet carrying executable code — via an e-mail attachment. Once the attachment is opened, the attacker, using ports 12345 and 12346 on the desktop, or via HTTP Web protocol and file transfer protocol connections, can load a remote administration tool and order the Trojan horse to turn on the video and/or audio of the targeted machine.

By exploiting remote administration tools such as NetBus and Back Orifice, both of which the Army has proved can be used, the attacker can hijack desktop camera and microphone applications and then direct image and voice transmissions to the attacker's PC.

Because user-installed cameras and microphones usually don't have indicator lights, the victim is completely unaware of any eavesdropping, according to Hormann and others. And no desktop image, except maybe a small tool bar icon, will appear on the victim's computer to indicate that the audio and video capture are on, he adds.

Worse, said Powell Hamilton, manager of technology risk services at PricewaterhouseCoopers in Los Angeles, attackers can use the same tactics to hijack an online meeting session conducted through systems like Microsoft Corp.'s NetMeeting and grab shared whiteboard information.

One comforting fact, Hamilton said, is that microphones and cameras have yet to proliferate across the enterprise because image, voice and videoconferencing technologies are still rough around the edges. And, he adds, fear of remote spying and information breaches will probably continue to stall widespread adoption.

There's a warning that bears repeating: Keep virus- and intrusion-detection tools up-to-date. Symantec Corp.'s Norton AntiVirus, for example, recognizes when NetBus 1.6 and 2.0 and Back Orifice and Back Orifice 2000 are running on a desktop.

But hackers now possess compiling tools to change the attack signatures, making it more difficult for packaged applications to catch these attacks. In addition, Hamilton said, nearly 40% of the client sites he has reviewed don't have virus protection, and 90% don't use intrusion detection software.

Given the voyeuristic ways of hackers and rising concern over electronically committed corporate espionage,

> **You can hear the guys talking [from another room], but they have no idea you're listening to them.**
>
> JEFF HORMANN, SPECIAL AGENT IN CHARGE, COMPUTER CRIME RESIDENT AGENCY

now is a good time to take inventory of your organization's microphones and cameras. If users have deployed these devices, teach them to manually cap cameras and unplug microphones when not in use. And if your organization is moving toward adoption of voice and video technologies, pay for higher-end microphones and cameras with indicator lights. ▶

DEBORAH RADCLIFF is a freelance writer who specializes in technology crime. She can be reached at DeRad@aol.com.

TECHNOLOGYNETWORKS

BRIEFS

Tool Secures Oracle, SQL Server

Atlanta-based Internet Security Systems Inc. has announced the availability of Database Scanner 3.0. The product was designed to let customers manage the security of Oracle8i, Oracle8 and Oracle7.3 database servers and protects electronic-business systems. It also supports Microsoft SQL Server 7.0 and 6.x and Sybase Adaptive Server 11.x database systems, running on either Unix or Windows NT platforms. The product has a starting list price of $995 per database server for SQL Server and $1,995 per server for Oracle and Sybase installations.

New VPN Option For Firewall Server

BorderWare Technologies Inc. in Toronto announced a new IPSec virtual private network (VPN) option for the BorderWare Firewall Server.

The VPN implements the latest IPSec security protocol and Internet Key Exchange standards, allowing it to be fully interoperable with other IPSec-compliant products and dynamic key exchange implementations. The IPSec VPN option will start shipping Oct. 15 and will be priced from $600 for a 25-user firewall to $2,000 for an unlimited firewall.

Phobos Offerings Manage Net Traffic

Phobos Corp. has unveiled a new line of hardware devices that were designed for managing and optimizing Internet traffic.

Rick White, president and CEO of Phobos, said the new products, announced at the NetWorld/Interop 99 show in Atlanta, will improve the response time of Web sites by balancing Internet traffic over multiple servers housed in one or many locations. Salt Lake City-based Phobos makes network interface cards and switches.
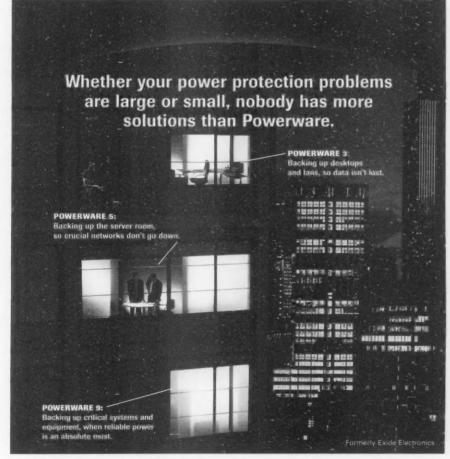
Called the IN-Product line, the offerings consist of Peripheral Component Interconnect adapter cards that are installed in the expansion slots of a server. Each card has its own processor, operating system, memory and flash storage as well as an internal bus.

T1 Link for Firewall

Technologic Inc., the Atlanta-based division of aSoft Inc. in Broomfield, Colo., is providing direct, high-speed T1 connectivity to its Interceptor Firewall Appliance. The new product, Version 4.2, allows businesses to implement a secure firewall solution to access Internet and intranet data without sacrificing connection speed. The product is shipping at a list price of $1,190.

Nokia Boosts VPN Fail-Over, Load Sharing

Nokia Corp. is offering high-availability VPN fail-over and load sharing in its VPN 200 line of security appliances. The enhancement supports VPN fail-over to transparently increase VPN availability to users, partners, customers and remote offices, according to the Espoo, Finland-based company.

A Talisma for Firms Facing E-Mail Crises

Aditi Corp.'s e-mail management services help dot.coms boost customer response

BY EMILY KAY

THE SITUATION couldn't have been worse. Software Direct inadvertently shipped the wrong product to a purchaser in New York.

"The customer ordered Microsoft Front Page 2000, and we accidentally shipped him the upgrade version — by ground shipment, across country," says Todd Seth, president of Software Direct, an Internet-based computer software reseller in Vista, Calif. The customer "was really ticked," Seth acknowledges. "But we responded so fast, saying we'll send a replacement [for next-day delivery at no charge] and here's the tracking number. His message came back within 10 minutes, 'Wow. I didn't expect that.' "

Seth credits his firm's quick response to Aditi Corp.'s Talisma customer e-mail and Web-based form-management software. Seth, like other savvy dot.com business executives, says a huge volume of hits on his company's e-commerce Web site means nothing if he can't turn surfers into customers. Talisma helps him do that by enabling his sales and support staffs to respond quickly and effectively to customer queries.

E-commerce spawns customers who require service, largely through e-mail. With the competition just a mouse click away, successful Web-based businesses must meet the enormous volume of requests for information and service that flood their sites, many of which are addressed to active e-mail aliases such as info@company.com or support@company.com. Companies are far more likely to retain Web customers by responding to them quickly and accurately.

Canned acknowledgments a week later are insufficient, notes Pradeep Singh, Aditi's founder and CEO.

The reality is, however, that many corporate Web sites don't provide the fast, proficient and precise service that Web customers demand. In a recent test of how well leading retail, brokerage and Internet software firms deal with inbound e-mail messages, The Yankee Group in Boston found that fewer than 30% of the companies responded to questions within 24 hours. Only 60% responded within 48 hours, and a few didn't reply at all. And those that did reply answered questions correctly only 50% of the time.

"Companies still have a long way to go in providing improved customer service by e-mail," says Steve Robins, an analyst at The Yankee Group.

Aditi seeks to tackle that problem with targeted customer service applications — what the company calls "e-service." With Talisma, a team of customer service agents can manage Web site interactions by monitoring and responding to electronic queries. The product was designed to handle e-mail, Web forms and integrated phone messages. The software, which supports a Microsoft Access database on the back end, routes customer communications to a queue from which agents can retrieve the next available query.

Through its outsourcing unit in Bangalore, India, Aditi also manages support services for customers such as Microsoft Corp. and Seattle-based RealNetworks Inc.

RealNetworks uses Aditi's technical support expertise to support more than 72 million users of its popular RealPlayer multimedia software, says Dave Hardwick, customer relations manager at RealNetworks. "Aditi offers two things that a U.S. outsourcer can't: very high-quality representatives at a much lower price," Hardwick says.

Fielding an ever-increasing volume of technical support questions, external assistance was the only cost-effective means for RealNetworks to serve its Web users without entering the tech-support business itself.

"RealNetworks is in business to be the leading developer of streaming audio/video, not a customer service expert," says Hardwick. Aditi enables RealNetworks to stick to its core business and support customers at the same time, he adds. ▶

Kay writes about technology as a principal at Choice Communications, an editorial consulting firm in Chelmsford, Mass.

PRADEEP SINGH, CEO and founder of Aditi Corp.

Aditi Corp.

Location:
10940 NE 33rd Place, Ste. 204
Bellevue, Wash. 90004

Telephone: (425) 897-2900

Web: www.aditi.com

Niche: E-mail/Web forms management software

Why it's worth watching:
• It has a solid list of partners, including Microsoft, Hewlett-Packard Co. and the Software Support Professional's Association.
• A small company like Aditi has a good chance of success because so many companies still lack e-mail management systems, says Mark Levitt, an analyst at International Data Corp. in Framingham, Mass. "Aditi can do well in its niche," says Levitt.

Company officers:
• Pradeep Singh, founder and CEO
• Kornel Marton, chief technology officer responsibilities (there's no official CTO or CIO)

Employees: 310

Milestones:
• 1994: Company founded
• 1998: Talisma released

Customers: Software Direct (www.softwaredirect.net) and VisualCommerce Inc. (visualcommerce.com) use Talisma; Microsoft and RealNetworks (www.realnetworks.com) use Aditi's outsourcing services.

Burn money: Self-funded

Products: Talisma e-mail and Web form-management software for Windows environments; development services (custom application development); support services (outsourced technical support)

Red flags for IT:
• The use of Microsoft Access database limits the scalability of the product. Talisma's next release will support SQL Server.
• Aditi's client list is less impressive than its competitors'. Kana Communications enlisted 50 new customers in the second quarter, including the Chicago Board Options Exchange and Sony Corp.

[the buzz]
STATE OF THE MARKET

E-Mail Tools Still Missing Links

So few Web-based businesses provide satisfactory service by e-mail that the burgeoning e-mail management arena offers enormous opportunities for Aditi and its competitors. Some 20 small and start-up vendors, including eGain Communications Corp. (www.egain.com) in Sunnyvale, Calif., Kana Communications Inc. (www.kana.com) in Palo Alto, Calif., and Mustang Software Inc. (www.mustang.com) in Bakersfield, Calif., sell similar products, says Mark Levitt, an analyst at International Data Corp. in Framingham, Mass.

The e-mail management niche has yet to attract large suppliers, but the current players are expanding rapidly. Kana, which recently filed an initial public offering, boosted revenue from $656,000 last year to $3.6 million so far this year. Its customers include General Motors Corp., Lycos Inc. in Waltham, Mass., and Excite Inc. in Mountain View, Calif. Mustang's customer list includes such notables as Time Warner Inc. in New York, Costco Companies Inc. in Issaquah, Wash., and Barclays Bank in the U.K.

Functionally, Talisma is missing some pieces its competitors already have. It doesn't automatically route questions to specific agents or zip off responses to customers, but Talisma will provide those features in the future.

In addition, Kana, Mustang and eGain already support Oracle Corp. and Microsoft Corp. SQL Server databases, which enable information technology managers to accommodate increased usage far more efficiently than IT managers employing Talisma's Microsoft Access database. But Aditi will also target the enterprise with a more scalable SQL-based release of Talisma later this year. An Oracle version will follow, adds Aditi CEO Pradeep Singh.

Pricing is already on Aditi's side. Talisma sells for $1,000 per seat, while a typical Kana or eGain e-mail management implementation starts at about $50,000. Mustang's pricing is more complex, starting at $1,600 for five users of the business edition of its Internet Messaging Center software. For organizations with more than 25 customer service representatives, the next version of Talisma will have a price tag similar to those of its competition.

– Emily Kay

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Corio	Hexaware Technologies	Oracle Consulting		

Superslim PCs: Lean and Costly

BY CHRISTOPHER LINDQUIST

THINK WHAT YOU COULD DO with a desktop PC that is smaller than most monitors. Beyond the slim desktop systems' lean looks, there are other good reasons to consider these new PCs for your enterprise.

Price has long been the biggest hurdle for ultra-compact machines, but that has begun to change. LCDs remain costly, but other components such as processors, memory and hard drives have become cheaper, allowing manufacturers such as Gateway Inc. and Sony Electronics Inc. to build smaller desktop machines inexpensively enough that the price doesn't overshadow the benefits.

All of these machines share several features, including LCD displays, low to moderate power requirements and reduced heat output. Many of these benefits are a direct result of integrating laptop parts such as smaller hard drives and more compact motherboards.

The machines are eye-catching alternatives to standard PCs, making them ideal for highly visible locations such as receptionist desks and showroom floors.

Their modest power requirements can be put to use in situations where electricity may be limited or unreliable and subject to backup by uninterruptible power supplies. The machines' lack of a CRT monitor means reduced electromagnetic radiation, a common concern for sensitive locations such as hospitals.

These benefits are balanced by several factors, however.

Laptop parts on the whole are more expensive than similar desktop hardware.

Performance can also suffer compared with full-size desktop machines, as the current crop of superslim systems often lack the latest Accelerated Graphics Port (AGP) graphics cards or the highest-end processors. The systems also aren't as expandable because they tend to have only one or two open Peripheral Component Interconnect (PCI) slots if they have any at all.

But in places where you need a PC and a standard desktop won't suffice, a superslim may be the ideal answer. Read further to find out about three of the most recent models from Gateway, Sony and The Brick Computer Co. ▶

Lindquist is a freelance writer and reviewer in Moss Beach, Calif.

GATEWAY'S PROFILE is a good choice for small or highly visible locations

Profile

Gateway Inc.
www.gateway.com
Price: $1,999 basic configuration

When it launched the Profile earlier this year, Gateway caused a stir. Through judicious use of laptop parts and a clever design, the company managed to drop an entire PC into a package only slightly larger than a standard 15-in. LCD monitor. And it did it for a price that didn't induce immediate sticker shock in either corporate or home buyers.

Only drive slots on the side of the display bezel and a set of ports on the back – Universal Serial Bus (USB), mouse, keyboard and audio – betray its true identity as a PC. Hidden inside, you'll find a 400-MHz AMD K6-2 processor, 64M bytes of RAM (upgradable to 256M bytes for a steep $700 premium), a 4.3G- or 6.4G-byte hard drive, a 56K bit/sec. fax/modem, a 10/100M bit/sec. Ethernet port and a 4M-byte AGP graphics controller. Depending on options such as drive capacity and whether you get a CD-ROM or digital video disc drive, the system can cost just under $2,000.

That's pricey for a 400-MHz PC – even with an LCD monitor – but as a classy, cutting-edge system for up-front locations, it may be the perfect computer.

ThunderBrick2

The Brick Computer Co.
www.ergo-computing.com
Price: $2,795 basic configuration

The Brick's ThunderBrick2 system lacks the streamlined styling of Gateway's Profile – opting instead for a larger, more boxy look – but it offers a few extra features that could be valuable to some buyers.

Like the Profile, the Thunder-Brick2 is an all-in-one system with a 15-in. LCD display, a pair of PC Card slots, USB ports, parallel and serial ports, 10/100M bit/sec. Ethernet and a single cord. Also like Gateway, the Brick will eliminate a couple more cords with optional wireless keyboards and mice. Unlike the Profile, the Brick system doesn't require a power brick.

The Brick also offers up to 500-MHz Pentium III processors and 20G-byte hard drives. The trade-off is price: You can purchase a Profile for just under $2,000, but a ThunderBrick in an only slightly more beefy configuration costs nearly $800 extra.

THUNDERBRICK2 has a boxy look

That said, the additional flexibility of faster processors, a PCI slot and bigger hard drives make the ThunderBrick2 worth considering for more power-intensive applications that still would benefit from a more compact design.

Vaio Slimtop PCV-L600

Sony Electronics Inc.
www.sony.com/pc
Price: $2,499

Sony's Slimtop computers straddle the line between conventional desktops and all-in-one systems such as the ThunderBrick2 and the Profile. Rather than having an integrated monitor and CPU, the Slimtop consists of separate units, though the CPU is little more than a foot square and just under 4 in. thick.

That separation provides a larger case that allows room for a pair of standard PCI slots (though one is already used by a V.90 modem). You can also buy a Slimtop without an LCD display and substitute your own monitor.

SLIMTOP features a two-piece design

The two-piece design also means that you need two outlets for power, and moving the system around is more cumbersome than an all-in-one system.

Beyond that, the Slimtop continues Sony's trend toward desktop innovation. Although it lacks a FireWire port and the 10/100M bit/sec. Ethernet port found on the ThunderBrick2 and Profile, it does include a Memory Stick media slot.

The standard LCD offers only a 14.1-in. diagonal, compared with the 15-in. displays on the Profile and the ThunderBrick2. But Sony ups the ante by including 128M bytes of memory and a 10.8G-byte hard drive standard for its $2,499 price tag.

64-Bit Update

BY TIM OUELLETTE

IN THE YEAR since *Computerworld* last reviewed 64-bit processors, not a lot has changed. Intel Corp. is still working on its own 64-bit chip, called the IA-64. In the meantime, existing makers of 64-bit chips have been cranking up their offerings and improving their operating systems to keep their customers happy.

The 64-bit processor provides a lot more space to handle data and complete complex calculations. On 32-bit chips like the Intel Pentium, some data must be pushed off the chip to accomplish incoming requests, which makes the computer slower at certain tasks as the chip shuffles data back and forth to get everything done.

So applications that require heavy calculations and data movement, such as data warehouses, 3-D modeling, scientific formulas, high-resolution graphics and transaction processing, can be hindered when run on 32-bit processors.

Web Drives Need

Internet-based technologies, including video streaming, voice traffic and movies, which require huge chunks of processing time, have also been driving the need for 64-bit processors on Internet servers.

The 64-bit chip promises to help in this regard because the amount of space that's available isn't just twice as much as the space on a 32-bit chip, it's also an order of magnitude higher — well beyond the needs of desktop applications these days. For example, Intel says the IA-64 processor it's currently developing includes eight times as many registers as a typical Pentium chip, and a typical 64-bit file can be up to 4 billion times larger than a 32-bit file.

That's a lot of data to have readily accessible in the main memory of the processor. As a result, the processor doesn't have to call out to other areas of computer memory to get information or go get the infor-

mation from the slowest locations — hard and floppy disk drives.

But because all this extra room will only be used if operating systems and software applications are developed to run on 64-bit systems, most 64-bit chips will find their way into large servers, not desktops. One reason is that many versions of the Unix operating system that run on large servers are already made to run on 64-bit processors. But Windows and its applications aren't yet 64-bit ready.

With its IA-64 chip, Intel is the latest company to create a 64-bit processor, following in the footsteps of IBM, Sun Microsystems Inc., Hewlett-Packard Co. and Digital Equipment Corp. (now Compaq Computer Corp.) Intel has promised the chip for the past few years, and its development has created a broader interest in 64-bit computing among users.
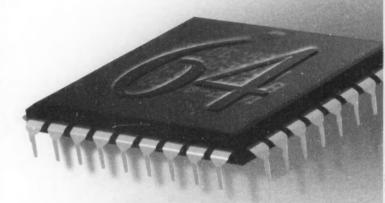
The IA-64 processor is creating a stir by offering to run both Windows and Unix applications and provide a more cost-effective path for desktop users to get 64-bit technology, whereas most 64-bit chips on the market today are targeted at high-end server uses. The chip makers usually tweak the processor to work best with their own servers and operating systems to get the best performance out of the applications (see chart). Most of these vendors have been shipping 64-bit processors for two years.

To date, this method has worked fine with users who require a powerful punch for their applications. For example, Dean McCarron, a principal at Mercury Research in Scottsdale, Ariz., says that if a site with 100,000 users on a specific application moves to a 64-bit processor and gains 10% more space, it could add another 10,000 users to the application without any performance loss.

But the legions of desktop users are another matter. Typical desktop applications simply don't need the power of 64-bit computing and would

DEFINITION

A 64-bit chip is a processor that runs a computer by using 64 bits of addressing space. That means the chip can handle 64 bits of data at a time, compared with the 32 bits of data managed by processors in desktop PCs. There's essentially more room for data to be moved, and it can be moved more efficiently and faster, resulting in faster computer performance.

leave all the extra space on a 64-bit processor sitting idle, analysts say.

In other words, throwing your copy of Microsoft Corp.'s Office or Lotus 1-2-3 onto a 64-bit processor wouldn't result in any performance gains at all — at least until those applications become so huge and complex that they need 64-bit technology to excel.

Wait Five Years

"For most end users, they won't actually see 64-bit processors in the next five years or so," McCarron says.

International Data Corp. in Framingham, Mass., predicts that adoption of 64-bit processors for the desktop will be slow because information technology decision-makers normally purchase the least-expensive system that will per-

form the desired function on the desktop.

The current crop of 32-bit processors does that quite well at a lower price than 64-bit technology, McCarron notes. In fact, Pentium chips also contain some of the same parallel technology used in the upcoming IA-64 processor, making them a much better deal for the desktop for years to come.

But for existing 64-bit users

and companies seeking extra processor power for their huge applications and databases, the move by Intel could be a good thing, as other vendors crank their own 64-bit processors up to new heights. ▶

Ouellette is a freelance writer in Scarborough, Maine.

MOREONLINE

For more information about 64-bit processors, visit our Web site.

www.computerworld.com/more

AT A GLANCE

64-Bit Processor Vendors

Major developers/suppliers of 64-bit chips:

Vendor	Processor	Features	Availability
Compaq	Alpha	Highest performance	Available on Compaq servers
Intel	IA-64	Supports NT and Unix	Next year
IBM	PowerPC	Tailored to run AIX Unix	Available on RS/6000
HP	PA-RISC	Tailored to run HP-UX	Available on HP servers
Sun	UltraSPARC	Tailored to run Solaris	Available on Sun servers

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USER SHOWS

GET A HIGH FIVE

Survey indicates that IT organizations place high value on user conferences for systems strategy, peer advice and training

By Tim Ouellette

WHEN DAVE GRUMM considered installing enterprise resource planning (ERP) software at Elkhart Products Corp., one of the first resources that he turned to for information was the ERP World East user conference.

His goal: "to gain additional knowledge on a variety of ERP systems as well as listen to companies that have installed or are installing ERP systems," says Grumm, group manager for MIS at the Elkhart, Ind., manufacturer of plumbing equipment.

In the age of Web-based support and giant trade shows, IT managers like Grumm say user conferences still play a vital role in the success of IT organizations and, in many cases, in the careers of IT personnel.

A recent *Computerworld* survey of 565 IT professionals indicated user conferences will continue to play a major part in users' systems strategies and training plans. Here's a summary of the results:

Survey Highlights

■ More IT professionals plan to rely on user conferences as a resource in their jobs, either for career development or to gain strategic information for their companies. More than 80% of the 565 respondents to the survey expect to see the same or increased rate of attendance at these conferences in the coming year.

■ Attendance at user conferences depends more on the quality of the content than on the cost. This means a company will likely send someone to an expensive conference as long as it feels a topic and sessions are relevant.

■ Users expect user conferences to provide good educational opportunities and offer ways to identify technical solutions to problems attendees are facing back at the home office.

■ One-third of IT professionals said their decision to increase or decrease attendance at user conferences this year is tied to year 2000 preparations.

■ At conferences, users spend 53% of their time at sessions, 33% of their time on the exhibit floor and 14% involved in other activities like meetings and networking.

■ The majority of users want to see even more education and training at user conferences.

■ Users rate vendor Web sites higher than user conferences as resources for obtaining needed technical information.

■ The top-rated shows all did at least one thing really well: They offered either excellent educational opportunities, strong presentations, valuable exhibits, access to vendor management or usable handouts and reference materials.

Respondents also said they regard conferences as a source of real-world information they can put to use immediately in their organizations.

More Users Plan to Attend

The fact that more information technology professionals expect to attend user conferences comes as no surprise to IT managers like Grumm. He says he liked having access to lessons-learned experiences from his peers at the ERP World conference, and he adds that the user session provided a great deal of value to companies like his looking at new IT strategies.

User conferences are shows that are run by independent user groups. Or they can be conferences that offer more user input and less vendor-driven, sales-oriented content than traditional trade shows.

"Being a user group financially independent from the vendor offers a distinct advantage in planning and controlling the content mix" of con-

TECHNOLOGY FIELD REPORT

THE NEED FOR EDUCATION and training sessions rated high in the *Computerworld* survey

ferences, says Don Payne, chairman of the Oracle Applications User Group's conference committee and director of information systems at Integrated Measurement Systems Inc. in Beaverton, Ore.

But a smart vendor can get involved with a user conference by offering user presentations and by allowing easy and noncontrolled access to vendor executives. And analyst companies, long accustomed to publishing reports for their clients, are now spreading their word to wider audiences with their own seminars and conferences on technical or vendor-related topics.

"Compared to trade shows like Comdex or other vendor-driven events, user conferences are superior for getting to real issues," says Jerry Egherman, a project manager at Memorial Health Services Inc. in Anaheim, Calif. This is because you get to hear the voice of real users in an unscripted format, he says.

For example, as an attendee, you're able to talk face-to-face with other people in the same boat as you, often discussing the installation or support of the same software package from the same vendor. That way, you get unfiltered information instead of vendor salespeople telling you what their product does, as opposed to what it does in the real world.

"We rely on user conferences . . . for more technical information and personal attention from our software vendor than [is possible at] a national conference like Comdex," says Jim Downey, IS manager at Columbus Metro Credit Union in Columbus, Ohio.

"I would have to say I trust a user conference more," says Rusty Burchfield, an IS technician at AMFM Inc. in Fresno, Calif.

At other shows or conferences, the experience can be like "shopping for a used car," he adds. "The salespersons don't leave you alone, and they will tell you anything to get you to purchase their product."

Quality vs. Cost

Users say they don't go to user conferences to buy products and gadgets, but to gather information to address problems back at the office or gain much-needed training.

That's why, when survey respondents were asked why they attend user conferences, the most widely chosen responses were "relevance of topic to my organization's IT or business issues" and "currently or plan to implement product." Cost and timing of the conference came in third and fourth place, showing that user conferences remain a valuable, and sometimes indispensable, resource for many IT professionals.

And because many vendors attend their user group conferences or sponsor their own conferences, user conferences represent a chance to let users control the course of events and get the information they want.

"My major reason for attending trade shows is to get

face time with vendor senior management," says Roger Jambor, an assistant vice president at The Dun & Bradstreet Corp. in Parsipanny, N.J.

Expectations

The results users see from attending user conferences include identification of solutions to technical problems and individual skill development. Most users said they don't expect user conferences to reduce operational costs or streamline business processes.

Year 2000

One-third of all respondents said year 2000 affected their attendance decisions.

Some (18%) said attendance would decrease because of year 2000 project workload. But 12% said they expected to increase their attendance at user conferences to hear Y2K lessons-learned stories and gain additional Y2K training.

And user groups have definitely beefed up their conference offerings in this area. Sev-

The Top Conferences

There are just about as many user conferences as there are computer products on the market today. The *Computerworld* survey tried not to focus on any one user type, but four conferences kept showing up as the ones survey respondents said they consider to be the most valuable: Common, HP Interex, Oracle Open World and Lotusphere.

The first three are run by independent user groups: Common, an IBM midrange systems user group; HP Interex, an independent Hewlett-Packard Co. user group; and the Oracle Applications User Group.

Only Lotusphere is run by a vendor: IBM's Lotus Development Corp.

Of course, if your company doesn't use products from any of these vendors, you wouldn't put these shows at the top of your list. But even if you don't attend these shows, it helps to understand why those who do rated them so high.

For example, Common's conference offers training and certification opportunities, and it was rated highest for educational offerings and industry expert presentation and participation. Survey respondents gave Oracle Open World the top nod for peer or user participation. They said Lotusphere has the best exhibits and demonstrations, and they gave it high marks for its training and certification offerings. They also rated HP Interex highly for its level of peer participation.

Other conferences received kudos for specific features. (See charts below and on page 90). – *Tim Ouellette*

CONFERENCE RANKINGS

1. Common
2. HP Interex
3. Oracle Open World
4. Lotusphere
5. SAS Users Group
6. Gartner Symposium
7. Informix WW User Conference
8. CA World
9. International DB2 User Group
10. Peopleshare

RANKED BY % OF RESPONDENTS WHO ATTENDED AND LISTED AS MOST VALUABLE

TECHNOLOGY FIELD REPORT

eral groups say that demand for Y2K-related sessions is up and that they have steadily increased the number of sessions they offer on this topic in the past few years.

The Sessions Are the Place to Be

The crown jewels of user conferences are the sessions, which can feature technical information, real-life user experiences, question-and-answer sessions with vendor representatives, education for certifications and more.

Attendees say sessions help determine whether a conference is good or bad. Poor sessions can suffer from too much vendor sales hype, but good sessions can offer answers to nagging technical questions.

"User perspective is a key differentiator for independent user groups," says Ronald Thielen, an assistant director for strategic initiatives and architecture at the University of Chicago and president of Share, an IBM large systems user group.

Exhibits can be valuable because value-added resellers are often in attendance, presenting products and services associated with a primary vendor's product.

The exhibits may help users learn how different products interface with a product they already use, says Metro Credit Union's Downey. In this way, the exhibit area can show an attendee the quality of relationships his software vendor has with other software and hardware companies.

Improvements Still Needed

Even with all the praise IT managers give user conferences, there is still room for improvement to make the trip worthwhile, respondents said.

Some attendees have had bad experiences at user conferences — especially when the content of the conference is too canned or marketing-oriented. Several users said they would never attend certain conferences again because of such experiences.

"I believe most professionals want in-depth information, not a lofty sales pitch, about the product they are looking at," says Coburn Maddox, a database administrator at Boise Cascade Office Products Corp. in Itasca, Ill.

One way some user groups

> ## Live interaction enhances the value of the information immensely.
>
> **RONALD THIELEN,
> PRESIDENT OF SHARE,
> AN IBM USER GROUP**

are addressing this problem is to join forces to offer different conferences on different topics at the same place at the same time — essentially giving attendees access to more educational opportunities in one trip. Each group still runs its own show but gives users access to the sessions and exhibits at other shows in the same conference center or in the same city.

For example, Share and another IBM user group, Guide, have colocated conferences in recent years, and they say they have seen attendance increase as more users seek access to their many training sessions.

And HP Interex colocated its conference with HP World, an Internet application service conference, ERP World and a Linux summit. The result: a major jump in attendance from 8,000 attendees last year to 12,000 this year, says Mike Doyle, director of business development at HP Interex, a not-for-profit, independent association of users of Hewlett-Packard Co. products. Many HP users who had been on the fence said they felt they had to attend because the group had added access to so much more information, Doyle notes.

Survey respondents said there are other areas where there's room for user conferences to improve. More than half (56%) said they want better information on vendor product plans, 55% said they want better documentation and handouts, and 32% said they want more user participation in the conferences.

User groups could take a lesson from Gartner Group Inc. Symposiums. Users surveyed gave these conferences the highest ratings for the ongoing communications and publica-

tions organizers provide to attendees. Such information is a valuable resource after a conference is over.

Some user groups have begun to offer their conference documentation, proceedings, slide show presentations and additional information on their Web sites for downloading.

Some respondents said it's up to both users and organizers to make the most of these conferences — and improve them.

"Both customers and vendors should use the conference as a means to express and gather constructive criticism," says Memorial Health's Egherman. "It makes no sense to have a user conference where the vendor pats their own back and the users take it sitting down," he adds. "I have attended conferences like that and have come away with negative impressions."

Vendor Web Sites the Top Choice

Even though users say they love conferences, the events don't seem to be their top source of IT information. Instead, survey respondents said vendor Web sites are the first place they go for information. They ranked user conferences fourth, after computer publications and "Other."

Some users say the Web sites fulfill a quick and immediate need but can't replace conferences. "The easy availability of electronic information on the Web satisfies a more quantitative need, whereas the people interaction and the comments [and] questions and answers you derive from sessions [at user conferences] satisfy a qualitative dimension," says one user, a consulting systems engineer at a manufacturer in the Northeast.

User groups are trying to improve their sites. For example, some have begun polling users on their Web sites to learn their latest concerns and thereby get the most up-to-date topics into conference sessions.

"The Web is a great place to find factual information," says Share's Thielen. "However, live interaction enhances the value of the information immensely and can lead to insights that the Web browser cannot yet convey." ▶

Ouellette is a freelance writer in Scarborough, Maine.

Usefulness of Top Attended Conferences

We asked respondents to rate the usefulness of conferences in several areas on a scale of 1 to 5 (with 5 being "most useful"). The following tables list the conferences, in order of usefulness, for each category:

EDUCATION	
Common	4.5
Lotusphere	4.3
Gartner Symposium	4.2

ONGOING COMMUNICATIONS AND PUBLICATIONS	
Gartner Symposium	3.8
Informix WW User Conference	3.8
International DB2 User Group	3.6

PEER PARTICIPATION	
Oracle Open World	3.9
Peopleshare	3.9
HP Interex	3.9

INDUSTRY EXPERT PRESENTATION AND PARTICIPATION	
Gartner Symposium	4.3
Peopleshare	4.0
Common	4.0

DIRECT COMMUNICATIONS WITH VENDOR	
Peopleshare	4.3
Informix WW User Conference	3.9
CA World	3.8

EXHIBITS/DEMONSTRATIONS	
Lotusphere	3.7
Informix WW User Conference	3.6
Peopleshare	3.6

Base: 565 IT managers, directors and CIOs in companies with 500 or more employees. No IT vendors were included in this survey

COMMON SECURITY AT LAST?

The government and some security vendors are teaming up to make sure security products really work. But will this noble effort make the security muddle worse instead of better? By Deborah Radcliff

BEFORE INSTALLING any new packaged applications, such as firewalls, secure operating systems or router upgrades, on Southwestern Bell Telephone Co.'s networks, a team of specialists routinely tests them to make sure the software won't open any security holes.

Nine times out of 10, the products fail to pass the security muster.

"We always end up going back to the vendors and asking them to reconfigure their products," says David Chester, regional manager of technical security at San Antonio-based Southwestern Bell.

It would be great, he says, if all these supposedly secure products stood up to some type of standards-based evaluation that would hold vendors more accountable for their products.

Chester's wish could come true by way of an emerging program called the National Information Assurance Partnership (NIAP), sponsored by the National Security Agency (NSA) and the National Institute of Standards and Technology (NIST).

In June, the NSA and several other countries that are friendly with the U.S. agreed to establish a common set of testing standards (called Common Criteria) for security tools, operating systems and even databases that could reduce buying confusion and lead to more secure products for corporate buyers.

Vendors that want to earn the NIAP seal of approval will work with the partnership to pass increasingly stringent levels of certification. If their products don't pass, they have the option of reconfiguring their code until they do.

Or not — but then they don't get the seal.

"In the past, you just had to accept vendor claims," says Michael Jacobs, the NSA's deputy director of information systems security. "If we're successful, products will be commercially marketable with the NIAP seal and will be available to anybody who chooses to buy them."

The NIAP's goals sound pretty promising, espe-

TECHNOLOGY

STANDARDS

cially given complaints by folks like Chester that operating system, networking and security software is inherently insecure.

"We analysts have three rules. [Rule one is] 'Vendors lie.' Rule two? 'Refer back to rule one.' Rule three? 'Go forward from there,' " says Patrick McBride, executive vice president at Meta Security Group in Atlanta.

Trouble in Paradise

The biggest problem industry specialists see with Common Criteria is the potential for government abuse through its control of software developers and corporate security configurations. They also say Common Criteria may actually cause more, rather than less, testing and market confusion.

"This idea is not new," says Dr. Gerald Kovacich, a former information systems security officer and high-tech crime investigator who writes and lectures on information security, warfare and crime. Kovacich chaired one of six groups that drew up an April 1989 report that concluded the NSA and NIST needed new guidelines that would be faster, internationally accepted and less complicated than the 16-year-old Department of Defense standards document, "Trusted Computer System Evaluation Criteria," known as the Orange Book.

Much like today's Common Criteria, the report Kovacich helped form was sort of an "underwriter's laboratory" to study feasibility, cost and user acceptance for commercial information security products and systems.

"This latest effort may have been delayed because of political infighting between the NSA and the NIST as to who will lead the [information security] standards efforts for the U.S. government, especially that effort outside the realm of the [Department of Defense]," Kovacich says. "After all, NIST stands for the National Institute of Standards, while the NSA stands for spying."

Take, for example, federal encryption controls like the recently announced Federal Intrusion Detection Network, which drew strong criticism from privacy groups until it was struck down by a budget committee. Given the government's track record in cyberspace, Kovacich says he worries about putting a program like the NIAP into the hands of the NSA. "Would you trust a product to be secure if it were approved by any part of the U.S. government, and in particular by a branch that is known to take advantage of system vulnerabilities and covertly crack code?" he asks.

The NIAP also has some vendors worrying about software regulations. Says Drew Williams, product manager at Axent Technologies Inc. in Rockville, Md., "The idea will open a whole new set of restrictive processes that could move to other technologies, like processors. I think this is going to be fraught with debate and resistance from the private sector."

He may have a point. But first, a short explanation: The Common Criteria standard was created in response to Presidential Decision Directive 63 (PDD63), signed last year by President Clinton to protect what the government calls the country's "critical infrastructure." The government is concerned that a well-orchestrated cyberattack on telephone, transportation, emergency services and other critical industries could devastate the economy and the country's ability to respond to war.

Jacobs predicts that, as a result of PDD63, some software policing policies will emerge from within the government. In addition, the FBI has been requesting federal authority to set security policies — which could include making buying decisions — for private-sector organizations that it considers critical infrastructure businesses.

For now, Jacobs says he doesn't anticipate any private-sector regulations emerging for vendors or buyers. But he says he's working with the Department of Defense and the national security community to obligate customers in those markets to acquire only evaluated products.

"It's an extraordinarily difficult job chasing a marketplace with hundreds of vendors and multiple hundreds of products, so we have to get some discipline here," Jacobs says.

The Making of a Standard

How Common Criteria works: The government issues a protection profile, much the way large-volume customers issue a request for comment or a request for quote. If a vendor wants this high-volume business, it submits its tool for testing against that profile.

The software then goes to one of seven private testing labs (scheduled to be fully operational next month) for evaluation. The labs run the products through tests and attacks.

If the product passes the functionality testing (the tool performs the way it's supposed to under profiled conditions), the results are passed to the **NIST** for validation. If tools don't pass, the vendors tweak the products and resubmit them for more testing until they do pass.

So far, eight vendor products – among them **Cisco Systems Inc.**'s Pix Firewall 520, **Lucent Technologies Inc.**'s Managed Firewall and **Oracle Corp.**'s Oracle V. 7.2 on NT 3.5.1 – have passed Common Criteria level 1 testing.

As the Common Criteria program matures, vendors can choose to submit their products for more rigorous testing – all the way to evaluation level (EAL) 8. At each level, the vendor must do more work, such as describing how it designed the product, submitting source code and developing new features or improving old ones.

Cisco's Pix Firewall achieved level EAL 2 because the vendor built in additional features.

According to **Chris Blask**, Pix product manager, one of those features was a TCP-based syslog server, which is less vulnerable to hacker attacks than its counterpart, UDP syslogs, which hackers can turn off to hide their activities.

"Our customers love this," Blask says. "And NSA ratification of the program is internationally regarded as quite an endorsement." – *Deborah Radcliff*

The benefit to buyers is that, under Common Criteria, they can view publicly available protection profiles of NIAP-approved products. They have the option of accepting the government's protection profiles or setting their own.

"Protection profiles are a generalized set of requirements that a consumer would put together — whether the DOD, the Commerce Department or private-sector customers. We're all customers in this game," says Ron Ross, NIAP director from the NIST office (part of the Department of Commerce) in Gaithersburg, Md.

And therein lies a new problem: If so many countries and buyers can specify their own protection profiles, then how can this possibly translate into less testing? So asks Donald Krysakowski, director of corporate programs at the International Computer Security Association (ICSA), a private security tools evaluation center in Carlisle, Pa. The ISCA has been approached by the NSA to act as a Common Criteria testing laboratory.

But at least on a governmental level, the program could reduce buying confusion.

The U.S., Canada, France, the U.K. and Germany (and, soon, the Netherlands) have thus far bought into the program and agreed to accept one another's validations without requiring the same vendor to repeat the process in their country.

Tricky Marketing

"In the past, the European standard was different than our Army [Orange Book] standard. So if vendors wanted to market a U.S. product, they went through the NSA's evaluation process. If they wanted to market in Europe, they went through International Security Standards and so on," says Jacobs. "It was chaotic."

Krysakowski and Kovacich also suggest that the government is notoriously slow. After all, the U.S. government's 54-page firewall protection profile is already 2 years old and hasn't been updated.

Arguably, the 16 types of attacks listed in the government's protection profile that it uses to test firewalls don't include several of more current attack methods. But that's why private-sector consumers can write profiles of their own, says Ross.

And buyers will no doubt write their own protection profiles.

Krysakowski also contends that the NIAP's profiles are confusing to buyers (like the lengthy firewall profile developed by the NSA). And it's even more difficult for buyers to write their own profiles, even with the NIAP-provided graphical user interface.

"If you're a moderate-size company that doesn't have someone to understand Common Criteria testing, you're out of the loop," Krysakowski adds. "Heck, it took us a long time to figure out how it all works."

Jacobs freely acknowledges that these and other problems need ironing out. "This is an iterative process," he adds. Jacobs says he would also like to see time and cost reductions as the program matures. The average certification process takes six months and costs vendors $250,000.

Taxpayers pay for the NSA and the NIST work, which includes overseeing the program, maintaining the documentation and validating test results.

"There is no silver bullet," Jacobs notes. "But the Common Criteria program has a great deal of potential to improve the security landscape for both public and private-sector organizations." ▶

Radcliff is a freelance writer in Northern California.

TECHNOLOGY FLASHBACK
50 YEARS OF TECHNOLOGY INNOVATION • 1950-1999

MPP Connects With Users

*Supercomputers
revolutionize
the industry*

BY LESLIE GOFF

IF SUPERCOMPUTING ever produced a super-star, it was Danny Hillis, who in 1986 at age 29 made an indelible mark on the industry when he demonstrated publicly the first massively parallel processing supercomputer.

Dubbed the Connection Machine (CM-1), it featured 64,000 processors, each with its own memory. By dividing a problem into pieces and assigning the various pieces to individual processors simultaneously, the CM-1 was capable of performing complicated calculations and tasks in a fraction of the time required by traditional symmetrical processing, which tackled a problem one piece at a time. It became the first in a series of supercomputers built by Hillis' company, Thinking Machines Corp. in Cambridge, Mass.,

which he had founded in 1983.

In its debut presentation, the CM-1 scanned 16,000 news articles in 1/20th of a second and mapped out the circuitry for a 4,000-transistor computer chip in three minutes, according to an article in *Time* magazine on

DANNY HILLIS, developer of the Connection Machine

June 9, 1986. "The conventional computer is to the Connection Machine what the bicycle is to the supersonic jet," *Time* quoted Hillis as saying.

Hillis' feat was hailed by the scientific community, and the

popular media painted him as a computer industry wunderkind. At MIT, he had developed a mechanical computer out of 10,000 Tinker Toys that played tic-tac-toe and never lost. He had designed toys and computer games for Milton Bradley Co. before embarking on his U.S. Department of Defense-funded research into parallel processing.

Although Thinking Machines attracted customers as diverse as American Express Co., Dow Jones & Co., NASA and several universities, in 1994 it filed for Chapter 11 bankruptcy. The company had doubled its revenue every year in the beginning, but with the end of the Cold War, the supercomputing niche ebbed. And with advances in technology, MPP had begun to grow as popular in business as in scientific computing; many of its concepts were folded into general-purpose computing, making specialized machines unnecessary.

In its Chapter 11 reorganization, Thinking Machines stopped manufacturing hardware and focused on the more commercial application areas that had emerged: analyzing

stores of untapped corporate data. The firm was purchased last month by Oracle Corp.

Hillis became vice president of research and development at Walt Disney Co. in 1996. In

this new role, he found the same level of energy and creativity he had initially found in computers, he told *The Boston Globe* on Aug. 11, 1996.

"I realized that, just as the space program was the big driver of technology at one time, the new driver is the entertainment industry," Hillis said in the *Globe* article.

Sun and Microsoft Go Public

BY LESLIE GOFF

When Microsoft Corp. and Sun Microsystems Inc. went public in March 1986, they didn't appear to be playing the same game, much less acting as arch rivals. Microsoft was staking its future on operating systems and applications for the PC. Sun was all about high-end, networked, Unix-based workstations, and most customers were still in engineering and technical environments.

All they seemed to have in common were charismatic leadership and successful public offerings. Microsoft raised $61 million on 2.5 million shares, making Bill Gates a billionaire. Sun garnered a total of $64 million on 4 million shares. New Ferraris were soon seen in Sun's parking lot.

But Sun's slogan, "The Network Is the Computer," proved

to be on the right track, and information technology has made the shift toward Internet-based computing. Microsoft and Sun have emerged 13 years later as quarrelsome competitors, battling it out over Java, Web browsers and now desktop productivity software.

"I don't think that, in the most literal sense, anyone would have thought of them as competitors as far back as 1986," says Laura Conigliaro, a computer industry analyst who follows Sun at Goldman, Sachs & Co. in New York. "But to the extent that trends have developed with networking and the Internet, it's not very surprising that both would be gravitating toward those."

Goff is a frequent contributor to Computerworld. Contact her at lgoff@ix.netcom.com.

1986

Microsoft Corp. moves from Bellevue, Wash., to new headquarters in nearby Redmond. The company introduces **Works for the Macintosh**, an integrated word processor, spreadsheet, database and communications program.

Steve Jobs buys a majority stake in **Pixar Animation Studios**, the San Rafael, Calif., division of LucasFilm Ltd. specializing in 3-D computer graphics. Jobs and his new company, **Next Software Inc.**, settle litigation brought by **Apple Computer Inc.** the previous year.

Ross Perot steps down from the board of General Motors Corp. and the leadership of **Electronic Data Systems Corp.** amid widely publicized disagree-

ments with GM. The automaker, which had been EDS's largest customer, had acquired the computer services firm in 1984 for $2.5 billion.

Harry Saal (below) and **Leonard Shustek** launch **Network General Corp.** to develop network management tools.

Satellite Software International changes its name to **WordPerfect Corp.** to reflect the success of its flagship product.

Hewlett-Packard Co. introduces its **Spectrum** family of RISC-based computers, culminating in a $250 million, five-year development effort.

Deriving from research done by **IBM** in the 1970s, the company's **PC/RT** debuts, but its price/performance fails to

match that of other RISC workstations. It proves a commercial failure.

Mips Technologies Inc. unveils the 8-MHz R2000 32-bit RISC processor with 110,000 transistors and a rating of 5 MIPS.

Wellfleet Communications Inc. starts up to make internetworking products.

Finis F. Conner founds **Conner Peripherals Inc.** in San Jose.

Gateway 2000 ships its first PC.

With the debut of the **Deskpro 386** (at right), **Compaq Computer Corp.** is one of the first companies to market with a PC based on **Intel Corp.**'s new **80386** 32-bit microprocessor. The 80386 gave PCs as much speed and power as some older mainframes. The 32-bit architecture made

it more practical for users to run graphical operating environments.

The **American National Standards Institute** finalizes the **Small Computer System Interface** (SCSI-1) standard.

The National Science Foundation establishes **NSFnet**, with a backbone speed of 56K bit/sec.

The **Internet Engineering Task Force** is formed.

The **Network News Transfer Protocol** is designed to enhance Usenet newsgroup performance over TCP/IP.

President Ronald

Reagan (at left) appoints a commission headed by former Sen. **John Tower** to investigate Reagan's National Security Council staff in the aftermath of revelations about the **Iran-Contra** scandal. It is revealed that profits from secret arms sales to Iran had been diverted to Nicaraguan rebels.

AT&T Bell Laboratories' **David Miller** patents the optical transistor, the **Self-ElectroOptic-Effect Device**.

The U.S. space shuttle **Challenger** explodes soon after takeoff, killing all seven aboard.

The **Chernobyl** nuclear power plant experiences a meltdown.

– Compiled by Leslie Goff and Computerworld librarian Laura Hunt.

■ Flashback is produced with the assistance of The Computer Museum History Center in Mountain View, Calif.

TECHNOLOGY SKILLS SCOPE

Making the Cut

Work-hard, play-hard e-commerce companies want fast-on-their-feet IT team players who can pick up the ball and run with it
By Emily Leinfuss

THE FAST-PACED, competitive world of e-commerce takes no prisoners. Customer-focused rather than technology-centric, these businesses want information technology professionals with work-hard, play-hard attitudes who are comfortable with change and chaos.

Finding them takes "guerrilla warfare," says one hiring manager. Keeping them working as a team takes "commando tactics," says another.

Companies don't care about book smarts or even specific technologies as much as they do about passion, a sense of community and customer focus, says Beverly Kahn, president and CEO of recruitment firm New Dimensions in Technology Inc. in Boston.

"The work style of an e-commerce project team is stunningly different than that of a Y2K operation," explains John Jordan, director of e-commerce research at Ernst & Young LLP in New York. "That means paying them better and treating them differently."

How different are the culture and talents of people suited for work in e-commerce? After talking with people involved in the realms of financial trading, pure electronic business and IT consulting, we found the differences lie in three areas:
■ Attitude: A positive, work-till-you-get-it-done mentality.
■ Aptitude: Team players and 100-percenters.
■ Ability: Top skills combined with pure raw inventiveness.

Vincent Phillips
Vice president of Web systems,
Charles Schwab & Co.,
San Francisco

Q: Schwab is so well-known in the industry, people must be flocking to you. Do you have enough IT staff?
A: I've been [in] e-commerce for three years, and we always have a ton of openings. Growth is the name of the game, and we constantly are trying to staff up for a new project.

Q: What are your biggest staffing and IT challenges?
A: We are always dealing with performance, availability and scalability issues. On the transactional side, the customer wants things fast and available. It is hard to find people with experience in dealing with 2 million Web customers. For IT skills, we are looking for C, [Common Gateway Interface], object or Java developers with strong verbal and communication skills.

Q: Do you run a tight IT ship?
A: New hires go through two training boot camps. The first integrates software development procedures and the drivers behind them, like performance, availability and testing. The second program is [based] around IT as a whole. That is where you get into scale issues and how to integrate with the rest of the company.

Q: Does that mean you steal all the good people away from the other Web development groups inside Schwab?
A: We all try to cooperate as much as possible. There is a strong incentive to make sure the operational, network and content sides are staffed, since we all work together.

John Vlastelica
Technical recruiting manager,
Amazon.com Inc., Seattle

Q: Define your hiring and talent needs.
A: We have a huge demand for people who have experience building relationships with customers online — people who bring together a retailing background and some IT background.

Q: What's it like to work at Amazon.com?
A: Well, it is summer in Seattle, so the halls are awash with shorts, flip-flops, Amazon.com T-shirts and squirt-gun warfare. It's a typical day in the life.

Q: Seriously?
A: We're serious. We hire smart folks, and they are working their butts off. There is a heavy dose of informality. People aren't title-centric; the best idea wins and the career path is often vertical crossover to management or content areas.

Q: What do you look for in IT staff?
A: The one thing that drives us is an obsession with the customer. What helps us make our selection decision is the question, "Is this a technical person who views technology as a means to an end, where the end is the customer? Or does this person define him or herself as just a Java programmer?" But the bar is incredibly high here. It is really hard for my team to find the combination of skills — the engineer who really understands the customer and the business.

Q: What are the reasons you don't get hired at Amazon.com?
A: Half don't make it because they are not strong enough technically. Other reasons have to do with soft skills — being open to ideas, just raw smarts and not being passionate enough. The problem space we operate in is unexplored territory.

George Hotter
Director of recruiting,
Extraprise Group Inc., Boston

Q: What is your IT hiring situation?
A: We are looking to triple the size of the e-commerce consulting and development group from 30 to 90 in six months. We have hired over 100 people in 16 weeks.

Q: How do you find that volume?
A: We use guerrilla warfare. We pull a lot of people out of the Big Five firms. We can offer them an opportunity that doesn't pigeonhole them into one particular practice area.

Q: What qualifies someone to work at Extraprise?
A: People who aren't hung up on titles and are looking for growth opportunities and challenge. It is a case of attitude over aptitude. People have to have a positive outlook on life, because what we do is hard. We need basic technology skills but not technology gurus; they have to understand the business aspects and the impact technology has on organizations.
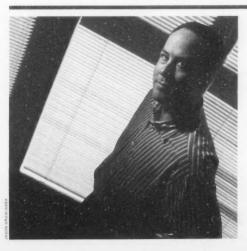
Q: That's all? You don't search for certain technology skills?
A: It is hard to articulate exact skills because *e-commerce* is such a nebulous term. Our focus is on the customer-facing application, to get our clients to sell and service their clients more effectively. We can do Web sites, marketing and branding, and we tie that into legacy systems [and] supply-chain production and automate the process.

Q: What do you think draws people?
A: Probably our pre-[initial public offering] status. ▶

Leinfuss is a freelance writer in Sarasota, Fla.

> " It is hard to find people with experience in dealing with 2 million Web customers.
>
> **VINCENT PHILLIPS,**
> **VICE PRESIDENT OF**
> **WEB SYSTEMS,**
> **CHARLES SCHWAB & CO.**

Programmer Analyst - Sought by Clinton, IA consulting company to work in various unanticipated locations throughout the U.S. Under direct supervision, plan, analyze, design, develop, code, test and implement software applications including business programs. Installation of software applications and user training. Use of IBM AS/400, RPG/400, BPCS, UNIX, COBOL, and dBASE III+. Reqs. Bachelor's in Computer Science, Electrical or Electronic Eng., Math, Commerce or its equivalent in education and/or experience. $48,000/year, 40/hrs/wk, 8 AM-5PM. Respond by resume to Iowa Workforce Center, 2740 S. 17th Street, Clinton, IA 52732-7040. Refer to Job Order No. IA 1100908

Software Engineer needed by Austin based Co. dealing with dsgng & manufacturing of s/ware & h/ware to research, dvlp & dsgn s/ware systms realtime motion control using VB & C++. Masters in Electrical Engg or Comp Sci + 2 yrs exp reqd. Respond to: National Instruments Corporation, 11500 N. Mopac Expwy, Austin, TX 78759.

Database Administrator sought by Clothing Retailer in Houston, TX. Must have Bach in Comp Sci & 5 yrs exp in d/base admin, applic dvlpmt & system analysis. Please forward resume to HR-GMSP01, 5803 Glenmont, Houston, TX 77081.

Oracle Developer sought by Investment Research Co. in Chicago, IL. Must have Bach degree & 2 yrs exp in dvlpmt/use of institutional money mgmt s/ware. Respond to: HR Dept, Zacks Investment Research, Inc, 155 N. Wacker Dr, Chicago, IL 60606.

Systems Analyst needed by Korean Community Service Provider in Chicago, IL. Must have Bach in Comp Sci or related field. Respond to: Personnel, Korean American Community Services, 4300 N. California Ave, Chicago, IL 60618.

Software Engineer to write specific application software & code using COBOL, DB2 MVS/JCL and TSO. Design and develop databases using DB2. Create modifications to program designs. Implement system changes to database problems which may result from the modification process. Make necessary changes to system projects to achieve conversion interfaces for all software applications. Implement new designs and analyze and solve software and system problems. Requires: MS in Comp. or Info Science, Eng. or related field (will accept B.S. & 5 yrs. progressive exp. in the computer ind.) & 3 yrs. exp. in the job offered or 3 yrs. exp. as a Systems Analyst, Sr. Programmer or Programmer/Analyst. Exp., which may have been obtained concurrently, must incl. 3 yrs. exp. analyzing and solving software and system problems and 3 yrs. exp. using COBOL and DB2. EOE. 40 hrs/wk; 8:00 a.m. to 5:00 p.m. Salary: $65,000/yr. Send resume (no calls) to: Mel Richter, CTG, Inc., 2851 Charlevoix Dr., SE, Suite 203, Grand Rapids, MI 49546-7048.

Business Analyst - Oil & Gas to interface with customer to provide computer systems business analysis in one or more segments of the oil and gas industry. Eval. the tech. applications used by client and make recommendations to obtain the greatest efficiency through system modification enhancement and data mgmt. Develop a strategy for managing data and mapping data to facilitate integrated access. Manage the set-up & implementation of computer systems. Determine customer needs and design a business application strategy for various segments of oil & gas ind. Provide expertise to Account Executives in the oil & gas ind. in a sales support role. Requires: BS in Comp. or Info. Sci., Eng. or related field and 2 yrs. exp. in the job offered or 2 yrs. exp. as a Business Info. Mgr. or Team Leader. Exp., which may have been obtained concurrently, must incl. 2 yrs. exp. designing business application strategies for oil & gas ind. and 2 yrs. exp. managing the set-up & implementation of computer systems in the oil & gas ind. EOE. 40 hrs./wk.; 8:00am to 5:00pm. Salary: $100,000/yr. Send resume (no calls) to: Candace Allbright, CTG Inc., 3010 LBJ Freeway, Suite 140, Dallas, TX 75234-2704.

Programmer Analyst (2 positions) - Sought by Clinton, IA consulting company to work in various unanticipated locations throughout the U.S. Under direct supervision, design, develop, code, test and implement software applications. Analyze client requirements and design and develop applications to meet client specifications and goals. System testing and installation. Use of Installation of software applications and user training. Use of IBM AS/400, RPG/400, ORACLE, SQL 400, Query 400 and OS 400. Reqs. Bachelor's in Computer Science, Electrical or Electronic Eng., Math or Physics or its equivalent. Plus 2 years in the job offered or 2 years in a related occupation such as Programmer or Software Engineer. $52,000/year, 40/hrs/wk, 8 AM-5PM. Respond by resume to Iowa Workforce Center, 2740 S. 17th Street, Clinton, IA 52732-7040 Refer to Job Order No. IA 1100909

Prgrmr/Anlyst to perform numerical analysis on production systms & requirement analysis for material handling systms: analysis & design, convert project specs using flow charts & diagrams into sequence of detailed instructions & logical steps for software devlpmnt; implement new applications & provide support to existing applications & develop functional & design specs; evaluate performance & ensure quality & reliability of developed applications; design software applications including GUI & database designs; interact with clients to determine requirements for software applications; program software applications for advanced client/server environments & relational database systms using object oriented technology; relational database design & data modeling using CASE tools & techniques; plan, configure, & administer relational database systms; utilize performance enhancing query optimization techniques; test software applications; handle data migration issues; provide end user training & system documentation; enhance & maintain logistics applications. Perform duties using Oracle Developer 2000, Designer 2000, Oracle Financials, C, Fortran Pro*C, PL/SQL, SQL, UNIX, Windows 3.1 & Windows NT. Require M.S. in Comp. Sci., Mech. Eng. or related field. 40 hr. wk. 8am-5pm: $60,485.35/yr. Send resume with reference #19599 to MJC/ESA, P.O. Box 11170, Detroit, MI 48211-1170. Employer Paid Ad.

Business Systems Analyst: Conduct analysis and design of electronic financial products (e.g. letter-of-credit products) for PC Windows environment using Delphi (Pascal) language; install, support and maintain electronic financial products; conduct electronic product training; provide technical support, trouble shooting, and maintenance; assist in financial software testing, packaging, and user documentation.

Master's degree in Business Administration required. Master's coursework must include the study of letter-of-credit products. B.S. in Computer Science required. Six months experience in the position or six months as Systems Analyst &/or Programmer required. Experience in related occupation must include use of Basic and Pascal languages.

40 hrs./wk.; 8:15 a.m. – 5:00 p.m.; $56,555/yr. Must have proof of legal authority to work permanently in the U.S.

Send 2 copies of both resume and cover letter to **Illinois Department of Employment Security, 401 South State Street – 7 North, Chicago, IL 60605. Attention: Leila Jackson, Ref. # V-IL-020626-J.** NO CALLS. AN EMPLOYER PAID AD.

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DataSage, Inc. develops and markets solutions to help e-marketers optimize all of their activities at the individual level. These "individualization" solutions analyze each customer's click-stream data and purchase information to help companies increase customer revenue and improve customer retention. DataSage offers a complete software solution that combines world-class consulting services with robust, scalable technology, enabling businesses to analyze vast amounts of customer transaction data and maximize the value of their customer relationships.

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Candidates should have Unix, Windows 95/NT and automated test tools experience. Must possess at least a Bachelor's degree or equivalent in Computer Science, Engineering, or Mathematics.

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Candidates should have product development experience with Visual Basic 5, CORBA, ActiveX Controls and object-oriented design. Windows 95/NT, C/C++ or Java programming and Database experience required. Must possess at least a Bachelor's degree or equivalent in Computer Science, Engineering, or Mathematics.

Interested candidates should send their resumes to: Careers@datasage.com

Business Analysts: Positions available in our New York, Chicago and San Francisco area offices. Will work with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will apply OO analysis and design methodologies and object modeling techniques to design OO applications. Will be responsible for working with users to define system requirements. Will translate those requirements into clear and precise specifications for the developers to implements. Will design screens, write use cases, design and perform system testing. Requirements: Bachelor's degree in Business, Finance, Computer Information Systems or related field, or foreign equivalent. 2-3 years of business/systems analysis experience preferred, which should include software selection, design and/or development, implementation and/or conversion experience. If interested, please email your resume and cover letter to jobs@thoughtworks.com.

Applications/System Architects: Positions available in our New York, Chicago and San Francisco area offices. Will work with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will design, develop and implement enterprise wide, distributed applications in various OO, client/server, n-tier environments against various relational databases. Will utilize OO languages, including Forte and Java and relational databases such as Informix, Oracle, Sybase, MS SQL Server, and DB2. Will lead development teams. Requirements: Bachelor's degree in Computer Science, Computer Engineering or Electrical Engineering or equivalent, plus five years of experience, which must include experience in programming with an object-oriented programming language, or Master of Science degree in Computer Science, Computer Engineering or Electrical Engineering, or equivalent. If interested, please email your resume and cover letter to jobs@thoughtworks.com.

Technical Support Specialist: Works independently as a technical interface to customers in resolving RDBMS related problems. Develops resolutions for moderate to highly complex issues related to the maintenance, use, repair, and workarounds for RDBMS based products on multiple platforms. Tests and requests corrections for existing products. Assures the highest level of customer satisfaction.

Reqs: Position requires 4 years of experience in database administration, OpenVMS system administration, and customer support. Experience must include:
1) C
2) SQL
3) Cobol
4) Pascal
Job site/interview: Colorado Springs, CO $66,225/yr. 40 hrs/wk. Application by resume only. Send resume to job order number CO4632632, CO Dept. of Labor & Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117. EOE.

Technical Support Specialist [multiple openings]: Under close supervision, act as technical interface to customers in resolving issues related to the use of RDBMS CASE tools. Assist customer in application development using RDBMS CASE tools. Resolve technical issues and assure customer satisfaction.

Reqs: Positions require MS in CS, Engineering, or related field, or foreign equivalent. Educational or experience background must include:
1) Windows NT
2) Database application development in a client/server environment
3) PL/SQL

Job site/interview: Colorado Springs, CO $55,000/yr. 40 hrs/wk. Application by resume only. Send resume to job order number CO4632960, CO Dept. of Labor & Employment, Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117. EOE.

Software Developers: Positions available in our New York, Chicago and San Francisco area offices. Will work with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will design, develop and implement enterprise wide, distributed applications in various OO, client/server, n-tier environments against various relational databases. Will utilize OO languages, including Forte and Java and relational databases such as Informix, Oracle, Sybase, MS SQL Server, and DB2. Requirements: Bachelor's degree in Computer Science, Computer Engineering or Electrical Engineering or foreign equivalent. Academic coursework or projects should include programming in an object-oriented language. If interested, please email your resume and cover letter to jobs@thoughtworks.com.

Business Analysts: Positions available in our New York, Chicago and San Francisco area offices. Will work as team leaders with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will apply OO analysis and design methodologies and object modeling techniques to design OO applications. Will be responsible for working with users to define system requirements. Will translate those requirements into clear and precise specifications for the developers to implements. Will design screens, write use cases, design and perform system testing. Requirements: Master's degree in Business, Computer Information Systems or related field, or equivalent. If interested, please email your resume and cover letter to jobs@thoughtworks.com.

Lead Developer - Alpharetta, GA to research and implement new technologies. Require experience in software development using: OO middleware, Visual C++, Java, DCOM and SQL Server. Attractive compensation package. Send resume to Dept: MKG999, Denise A. Boeger, Daugherty Systems, Inc., 4501 North Point Pkwy., Suite 140, Alpharetta, GA 30022.

MARKETPLACE

GAINERS ⬆

PERCENT

Verilink	48.5
Comsat Corp. (L)	31.5
Pairgain Technologies Inc.	27.8
eToys Inc.	25.0
Micron	19.2
Tricord Systems	18.3
Secure Computing Corp.	16.3
Vitesse Semiconductor Corp (H)	15.1

DOLLAR

Qualcomm	19.63
Sony (H)	14.56
eToys Inc.	13.44
Vitesse Semiconductor Corp (H)	12.06
Comsat Corp. (L)	8.63
Citrix Systems Inc. (H)	7.88
Hitachi Ltd. (H)	7.13
Network Applinace Inc. (H)	6.63

LOSERS ⬇

PERCENT

Manugistics Group Inc.	-21.8
NCR	-19.5
Maxtor Corp.	-16.8
Systems & Computer Technology	-16.7
PSINet Inc.	-16.3
Gartner Group	-14.7
Cambridge Technology Ptnrs	-14.5
TenFold Corp.	-14.1

DOLLAR

eBay Inc.	-12.38
Ariba Inc.	-11.94
Juniper Networks Inc.	-11.75
America Online	-10.44
Motorola	-8.94
Hewlett-Packard Co.	-8.81
Red Hat Inc.	-8.50

AOL Takes Beating After Dire Prediction

But most analysts remain bullish on Net giant

BY LAURA HUNT

SHARES of America Online Inc. (NYSE: AOL) dropped 6 1/6 points last Monday to close at 90 1/8 amid speculation fueled by a columnist's remarks on Barron's Online. But most analysts aren't buying the prediction made by Doug Kass at Seabreeze Partners.

Kass wrote that he has been short-selling AOL since the stock reached around 146 in April (see chart). He predicted that the stock price for the largest Internet service provider will drop as much as half, citing recent insider sales of about 4 million shares by CEO Steve Case and other executives, slower subscriber growth and Internet-access discounts offered by PC makers. Kass says he believes that increased price competition

from PC manufacturers, and from competitors' free Internet offerings to lower its $19.95 monthly access fee, significantly lowered its revenue base.

But most analysts remain confident that the blue-chip provider will remain atop the Internet heap. Jamie Kiggen at Donaldson Lufkin & Jenrette Inc. wasted no time with his response, reporting on Tuesday that he has raised his September subscriber estimates for AOL to 975,000, up from 900,000.

David Zale at Sands Brothers & Co. Ltd. in New York says AOL has shown that it can adapt to changing needs in the market and that its record of gaining and keeping subscribers will help it survive and retain its long-term competitive position.

INDUSTRY ALMANAC

Doug Makin at ABN AMRO in New York also remains positive about AOL. Although AOL's subscriber fees are responsible for about 75% of its revenue, Makin questions the assumption that everyone will be offering free Internet access in the future. "Will the Internet pricing structure erode faster than AOL can respond?" Makin asks. He says he doesn't think so, citing AOL's strong subscriber base, which boosts its efforts in e-commerce, advertising and marketing.

Most firms rate AOL a Strong or Moderate Buy. In spite of speculation about AOL's ability to remain competitive in the wild world of the Internet, most analysts say its 17 million subscribers are reason enough to be positive about its future. As Zale notes, "AOL is the primary engine and growth company for the Internet." ▶

AOL's Bumpy Summer

AOL's stock price fell to a six-month low last week after a columnist's dire prediction

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COMPANIES IN THIS ISSUE

*Page number refers to page on which story begins.
Company names can also be searched at*
www.computerworld.com

Floyd

nate power sources, backing up systems tapes and, in some cases, relocating their computer operations and personnel out of Floyd's path. Mandatory evacuations gave some companies little alternative. Comdisco Inc., a $4.1 billion Rosemont, Ill., company that can reconstitute a company's front- and back-office systems out of harm's way, fielded disaster declarations from 29 companies — the greatest number to take that step for any single catastrophic event. Only 379 companies have done so in 19 years, a company official said.

"The predictions were very dire with the size and the strength of this storm," said Al-

lan Graham, senior vice president of operations at Comdisco. "Most Floridians have experienced a number of hurricanes over the years, and they're a fairly good judge of what's going to cause them some substantial [trouble]."

One Comdisco customer replicated its Jacksonville, Fla., site at its Connecticut facility. Another chose Denver. Others opted for Comdisco relocation centers in Atlanta, Chicago, Orlando, New Jersey, Texas and Toronto. Three customers were fortunate to get all-clear signs from officials at home before making the switch.

Most relocations involved back-office systems that required only four or five people to restore operations.

To keep its lines open, Merrill Lynch & Co. moved more than 50 key workers, including

IT staff, from its Jacksonville call center to an out-of-state site, and routed customer calls to Denver and Somerset, N.J.

Blumenthal Mills Inc. took matters into its own hands late Tuesday night, switching all day-to-day computing from its Marion, S.C.-based IBM AS/400 to a look-alike machine in New Orleans.

Normally, the Louisiana-based AS/400 serves as a development and hot backup machine. But with Floyd coming, IT staffers at the textile manufacturer verified that the machines were synchronized and that all the fields were correct. (A practice run a few weeks ago in advance of Hurricane Dennis helped.) "We get used to category 3 and 4 storms, but when they're strong category 4, we worry," said Ed Griffin, an IT manager at Blumenthal

Mills, which is 35 miles inland. "Our main concerns are the high winds and flooding due to rain and hurricanes, which often spur tornadoes."

One of the biggest problems is getting IT staffers to the office safely. Jim Koontz, manager of information systems at Central Carolina Bank & Trust Co. in Durham, N.C., said he dodged power lines in the aftermath of Hurricane Fran in 1996. One of the bank's systems programmers needed a ride after a tree fell on her car.

Regulators require banks to have business contingency plans in place, so the bank's emergency management team, which includes IT staffers, was prepared. Hotels were secured for critical workers. Backup tapes prepared on a nightly basis were set aside in tubs, ready to leave at a moment's notice for the company's disaster recovery site in Philadelphia.

Central Carolina Bank & Trust already has equipment wired to its backup generators as a matter of course. After Hurricane Fran, staffers had taken further steps to ensure that all equipment was hooked into the company's diesel generator, Koontz said.

"With a hurricane, you know it's coming," Koontz said. "You do have a chance to make sure everything is very well organized and coordinated."

Experiences from Hurricane Fran — which caused power outages that ranged from days to weeks — prompted many inland-based Carolina companies to take extra precautions. Martin Marietta Materials Inc. in Raleigh, N.C., shut down systems Wednesday at 5 p.m. and had staffers unplug all PCs and monitors and run complete backups of all servers earlier than usual.

One of the backup tapes was sent to its storage company, and another set of backups went home with one of the administrators "just in case," said John Berggren, a senior support technician.

Hurricanes leave many companies relying on older technology. The Home Depot Inc. opted for telephones and conference calls rather than e-mail or computerized supply-chain

systems to make sure extra plywood, batteries and other emergency supplies reached stores from Virginia to Florida. Last Monday and Tuesday, Home Depot trucked 580,000 sheets of plywood to Florida, well above its typical two-day shipment of 26,000.

"We rely on ... store managers talking to district managers in the field, asking them what they can give up to their brother and sister stores," said Don Harrison, a Home Depot spokesman.

A spokeswoman for Lowe's Cos. in North Wilkesboro, N.C., said individual stores called or faxed requests to its command centers in Valdosta, Ga., and Statesville, N.C., which input the inventory into computers. ▸

Plans Being Laid For Next Time

Preparations for Hurricane Floyd tested the systems of airlines and travel agencies hit by a rash of cancellations, postponements and redirections.

In the future, Minneapolis-based Carlson Wagonlit Travel, which has numerous franchise offices in the Southeast, plans to send disaster-related news and cancellation policy information to agents via e-mail and its Mercavia intranet site, said company spokesman Steve Loucks.

Time constraints due to the volume of Floyd-related calls hampered the company from using its intranet to disseminate information this time, Loucks said.

Mark Reinke, president of a Carlson Wagonlit franchise in Atlanta, said e-mail and intranet-based information would help, since his agency gets flooded with faxes from cruise lines and tourist boards.

"Once all the tourist boards and hotels realize they can contact agencies that way, it will be a lot more helpful. ... We get so many faxes a day, they can get lost," Reinke said, although he noted that many agencies still don't have Internet connections.

For flight information, his agency still relies on its airline computer booking system.

– Carol Sliwa

Supercomputer Gives Navy An Accurate Early Warning

BY JAIKUMAR VIJAYAN

It cost the U.S. Navy an estimated $5 million to move part of its Atlantic fleet out of Norfolk, Va., in advance of Hurricane Floyd last week. But staying put could have proved even more expensive.

Helping the Navy arrive at its decision were supercomputers at the U.S. Navy Fleet Numerical Meteorology and Oceanography Center (Fleet Numerical) in Monterey, Calif.

Hurricane models crunched out by the center's battery of Cray supercomputers from Cray Research Inc., a unit of Silicon Graphics Inc., predicted three days before the event that Floyd would make landfall in the Carolinas — even as everybody else was predicting it would land in Florida.

Soon, a new batch of supercomputers will allow Fleet Numerical to predict such disasters with even more accuracy.

Fleet Numerical last week signed an $18 million deal with SGI for new supercomputers based on the company's highly scalable Non-Uniform Memory Access architecture.

A CRAY SUPERCOMPUTER gave the Navy three days' warning that Floyd would hit the Carolinas

Hurricanes can currently be tracked only six days in advance, but the increased performance will let the center detect and track hurricanes like Floyd — and even much smaller ones — up to 10 days in advance, said Paul Moersdorf, scientific and technical direc-

tor at Fleet Numerical. It will also let the center gather far more granular details on the wind and weather patterns of such storms, Moersdorf said.

Such improvements are crucial for Fleet Numerical. Apart from weather forecasts for different defense agencies, the center also provides operational forecasts for the U.S military. In the 1991 Persian Gulf War, for instance, the center's computers were used to predict how dangerous Iraqi chemicals would be dispersed by the wind. The new computers will help the center predict such fallout within an accuracy of 3 kilometers — up from 150 kilometers in 1991.

The move to the new technology starts with the installation of a 128-processor SGI Origin 2000 system in November and will culminate with a 512-processor supercomputer in 2001.

When fully installed, the new computers will boost the center's overall processing capability tenfold from a current sustained peak performance of 10 billion floating-point operations per second (GFLOPS) to about 100 GFLOPS, Moersdorf said. ▸

FRANK HAYES/FRANKLY SPEAKING

Zero whining

IT'S BAD ENOUGH when Microsoft's Windows NT, Internet Explorer Web browser and free Hotmail e-mail service keep showing up with security holes. But it's much worse news when Microsoft starts denying responsibility. "This is not a security issue," a Microsoft representative whined about the latest Hotmail hole. "We see it as an example of people targeting users to run malicious code on the Web."

Earth to Redmond: That's what security is all about, protecting legitimate users and data from malicious users and code. The world has changed. Users aren't always friendly anymore. Deal with it.

Actually, I've got a lot of sympathy for Microsoft on this one.

It's embarrassing when a recently hacked U.S. Army Web site dumps NT because a Macintosh-based server is more secure. It's disheartening when news stories about Microsoft e-commerce initiatives and distributed-across-the-Internet applications are surrounded by yet-another-bug reports.

Microsoft is a big target, with plenty of hackers, crackers and Web hijackers looking for every possible way in, under, around or through the security of its software. With so much real-world probing every day, embarrassing and very public bug reports are just about inevitable.

It wasn't always that way. For decades, Microsoft's users *wanted* the software to work, in spite of its bugs. Did MS-DOS or Word or Windows or Visual Basic have defects? We worked around them, adjusted our expectations, made do. Not because we loved Microsoft, but because we had work to do. There was no upside to breaking the software we depended on.

Besides, in corporate IT shops, we knew we were in exactly the same spot. Our software wasn't perfect either. We did the best we could, but budgets and schedules and our ability to test weren't unlimited. And users — because their work depended on it — grumbled about bugs but kept working around them.

Then the Internet arrived.

And now users aren't just customers or employees, people who have paid or are getting paid for the privilege of working around those bugs. Now every competitor, snoop or high school kid with a social problem can take a

If we can't have zero bugs, at least let's have zero excuses.

crack at our Web sites and e-mail systems.

The old, friendly users didn't much like bugs, design flaws and security holes, but they lived with them.

These new hostile users love that stuff — it's how they get their jollies. Instead of working around bugs, they exploit every weakness, every flaw, every overflowing buffer, every opportunity to inject hostile code into our systems.

Hostile users *want* to break Microsoft's software. Hey, they want to break *our* software, too.

We've all gotten away with buggy code for a long time. But for e-mail and Web browser and operating system security, Microsoft can't afford that anymore. When it comes to Web sites and e-commerce systems, our businesses can't afford holes, either.

The bar is higher now for Microsoft. It's higher for us, too. And unless anyone thinks we can back away from the Internet (yeah, right), we'll never again have the luxury of dealing only with friendly users.

Maybe nothing is perfect coming out of the chute, but if we can't have zero bugs, at least let's have zero excuses. Find a hole? Close it. Find a flaw? Fix it.

But no whining. No denial. No "not-my-fault" finger-pointing. Those are just signals to hostile users that they're winning and that software developers are losing heart.

Microsoft can't afford to offer up that kind of vulnerability.

And neither can we. ▸

Hayes, Computerworld's staff columnist, has covered IT for 20 years. His e-mail address is frank_hayes@computerworld.com.

SHARK TANK

SEE, THERE ARE 24 HOURS. . . Eastman Kodak is doing an R/3 project. This includes installing SAP's data warehousing software. The IT folks tend to work 10 hours per day, minimum. Add in commuting time, and you're up to 12. "The joke is, 'Welcome to the team, we work half-days,' " says Eric Hunt, who's managing the warehousing program.

LATEST FREEBIE e-mail snafu: Network Solutions Inc. gives you a free Web e-mail account if you register a domain name. Tankster Brent gets one and discovers your user name is your domain name or your last name, and your default password is your user name plus *nsi*. For yuks, Brent tries a few names. Finds he could change passwords, send bogus e-mail – and alter domain name info. Jeez, why doesn't NSI just change its name to hackmenow.com.

SHARKY, CONSUMER HERO Two weeks ago, the Tank told how Pete, an IT vet, got hosed to the tune of $453 when Dell's online order system screwed up. Credit where it's due: Pete dutifully reports that Dell offered to knock $225 off the "adjusted" price. "Not enough effort," Pete says, "but some effort."

GUESS HOW SUN thinks you'll be spending the fourth quarter? Thrashing away at Y2K. A pilot fish hears Sun is prepping its suppliers for a lousy quarter. Seems IT will stop thinking about shiny new workstations and servers and focus instead on saving the business. The nerve!

TRUST NO ONE Pilot fish E. J. recalls that not 12 months ago, he was dragged into presentations singing the praises of Olicom's then-new Token Ring switching gear. The Token Ring consortium was a colossus, they said. Token Ring was the smart choice, they said. "The message was clear," E. J. writes: "Ethernet was for cheapies, and Token Ring was for the Enterprise!" Um, scratch that. Now Olicom is going Ethernet-only and sold its Token Ring products to Madge Networks. E. J. is left "wondering how Madge is going to treat us."

NO. 6 REASON NT 5.0 was renamed Windows 2000: That's how many service packs Microsoft will have. For the entire Top Ten list, which was presented at Microsoft Developer Days '99 in Long Beach, Calif., surf to *computerworld.com/sharky* to see the new Daily Shark. You can get fresh Shark meat every 24 hours. You can also get a cool T-shirt if we use your item. So dish it up: **sharky@ computerworld.com.**

The 5th Wave

TARZAN — LORD of the WEB

Maybe you write memos too long — last one make server traffic move like hippo through mud pit.

What your problem? No can swing link to link? Try going "ahAHahAHahAHah" real loud next time you click—ahahahaha.

This guy real interesting. Wonder how long it take to call in elephant stampede?

Why you say this not elegant interface? Tarzan work hard to design warthog icons!

E-mail Rich Tennant at theswave@tiac.net

A WORD ABOUT
THE NEW MANAGEMENT TEAM:
ATTITUDE

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